

AVIATION & SPACE CURRICULUM GUIDE K-3



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Federal Aviation Administration

Office of Public Affairs
Aviation Education Program APA-100-92
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Developed by the
Alabama State Department of Education
Montgomery, Alabama

***FAA
AVIATION EDUCATION
PROGRAM***

The Federal Aviation Administration (FAA) has a rich history of dedication and commitment to aviation education. The Congress has recognized this historic leadership role by requiring a civil aviation information distribution program within each FAA region to support the agency's aviation education program.

Aviation education is an integral element of the agency's mission and is essential to carrying out its responsibilities of promoting aviation and flight safety.

The agency is dedicated to the development and implementation of aviation education programs which provide general education for all citizens and information on aviation careers for America's young people.

FEDERAL AVIATION ADMINISTRATION

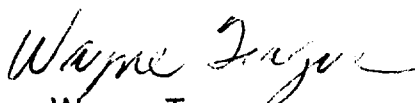


FOREWARD

The United States, world leader in air and space (aerospace) activities, is being challenged from many directions. To meet these increasingly competitive international challenges, we need a well-educated work force and a citizenry that understands the importance of aerospace activity to our society and its economy.

Students today live in an aerospace environment. If our youth are to understand that environment and develop the technology associated with it, they will need more education and training than did previous generations. As educators, we cannot begin too early to promote students' growth in basic knowledge, skills, and attitudes about aerospace that will be vital to living and functioning in tomorrow's society.

The Alabama Department of Education, in cooperation with the Alabama Department of Aeronautics, is proud to take a significant step in this direction. The Alabama Aerospace Curriculum Guide was written by a former Alabama classroom teacher who had a desire to share her aerospace education successes with other early childhood teachers. Iris Harris, 1987 Christa McAuliffe Fellowship recipient, spent a year in our department in order to make this guide possible. We believe that the education of our students will be greatly enriched because of the activities contained herein.



Wayne Teague

State Superintendent of Education

INTRODUCTION

The Alabama Aerospace Curriculum Guide is designed for teachers of grades K-3 who have little or no experience in the area of aviation or space. The purpose of this guide is to provide an array of aviation and space activities which may be used by teachers to enrich locally-designed programs.

The Alabama Aerospace Curriculum Guide is supplemental in nature. Teachers can infuse the exciting and highly motivating aviation and space activities into the core-curriculum: language arts, science, math, social studies and art. The practical application of these modern-day situations will give purpose to basic subject matter and make learning more meaningful.

The Alabama Aerospace Curriculum Guide has three distinct sections. The guide begins with a TABLE OF CONTENTS that lists the units and topics to be taught and specifies a page number(s) on which the units and topics may be found.

The second and largest section of this guide consists of seven units of classroom ACTIVITIES. Each unit begins with valuable teacher information concerning Purpose, Major Messages, Background Information, and Vocabulary Words. The vocabulary word list is used in conjunction with the Fantastic Flight Dictionary (Teacher Resource Section) throughout all seven units.

Activities in each unit are organized by topic. A summary at the beginning of each topic lists materials needed, grade levels, and subject areas for each activity. Teacher Resource Sheets and Student Handout Sheets, which are referenced in the activities, are located at the

end of each unit. These materials will need to be made into transparencies or duplicated for students.

The third section is referred to as the **TEACHER RESOURCE SECTION**. This section contains valuable materials that are referenced in the activities. Included in the section are the Glossary, Fantastic Flight Dictionary, Resource Speakers' Guide, List of Aviation and Space Books, and sources for Free or Inexpensive Teaching Aids.

ACKNOWLEDGEMENTS

From the beginning, the development of this document has been viewed as a cooperative effort between the Alabama Department of Aeronautics and the Alabama Department of Education. The Curriculum Development Section, under the leadership of Katherine Mitchell, had the responsibility for coordinating this project. Iris Harris, Aerospace Education Specialist, served as principle author and project director. Writing of activities, preparation of graphics, editing of drafts, typing of numerous revisions, and reading for technical accuracy and clarity took place over a period of ten months. The contributions of the agencies or people listed below are greatly appreciated.

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AEROSPACE EDUCATION

GRADES K-3

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UNIT 1: HISTORY OF AEROSPACE

PURPOSE OF UNIT 1

The purpose of Unit 1 is to introduce students to the development of flight. Specifically, students should:

1. sense that mankind has been fascinated with flight throughout history;
2. experience first hand the sensation of flight through kite-making and related activities;
3. recognize the names of persons who have made major contributions to the evolution of flight; and
4. be able to give examples of how air travel developed gradually over time.

MAJOR MESSAGES IN UNIT I

- Progress or improvement often involves numerous trials and errors.
- Success often requires that we try and try and try again.

BACKGROUND INFORMATION FOR UNIT 1

Unit 1 consists of 3 topics:

TOPIC 1: INTRODUCTION TO FLIGHT

TOPIC 2: MILESTONES PRIOR TO 1903

TOPIC 3: HEROES AND HEROINES: 1903 to Present

Topic 1 conveys that throughout history mankind has been fascinated with flight. At first, the ability to fly was considered a supernatural event. Folklore, legends, and art depict man's longing to soar to the heavens. Man has, in his imagination, traveled through air and space for as long as he has been on earth. Topic 1 emphasizes that in early history, people flew kites and were fascinated by the thought of flying like the birds.

In Topic 2, pictures of Leonardo da Vinci (1500), the hot air balloon of Montgolfier (1783), and the Zeppelin airship (1900) are presented as early milestones in the history of flight.

The first successful powered flight by the Wright Brothers in 1903 introduces Topic 3. Other heroes and heroines mentioned are:

Amelia Earhart

Charles Lindbergh

Robert Goddard

Neil Armstrong

Sally Ride

Christa McAuliffe

VOCABULARY WORDS FOR UNIT 1

Topic 1

kite
Chinese

Topic 2

balloon
dirigible
Leonardo da Vinci
airship
parachute
helicopter

Topic 3

airplane
rocket
glider
apollo 11
space shuttle

TOPIC 1: INTRODUCTION TO FLIGHT

The activities, suggested materials, grade level, and related subject areas for each activity are summarized below.

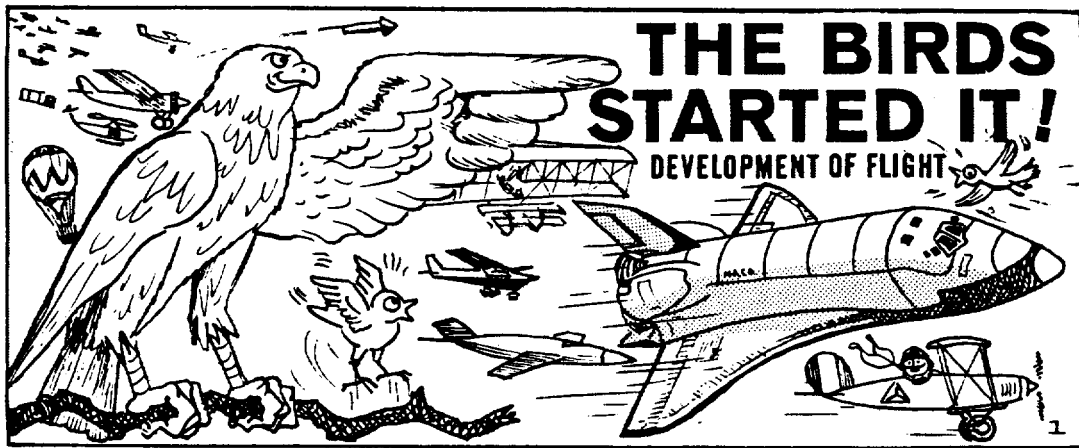
| <u>ACTIVITY</u> | <u>MATERIALS NEEDED</u> | <u>GRADE LEVEL</u> <u>SUBJECT</u> |
|-------------------------|--|--|
| 1. The Birds Started It | THE BIRDS STARTED IT, Student Handouts 1, 2, 3, and 4 | Grades K-1 language arts |
| 2. Making a Pre-kite | paper lunch bags tissue paper strips string hole punch | Grades K-1 art science |
| 3. Making a Kite | plastic trash bags or tissue paper 3/8" X 3/16" X 36" spruce wood sticks (keel) 3/8" X 3/16" X 30" spruce wood sticks (spar) 1" X 6' cloth strip (tail) string tape Fantastic Flight Dictionary | Grades 2-3 art science |

ACTIVITY 1: THE BIRDS STARTED IT

Begin by asking students questions that direct their attention to flying. Questions that can arouse interest are ones such as the following:

1. Have you ever wished that you could fly?
2. Why would you want to fly?
3. Where do you think airplanes came from?
4. How do you think people learned how to build airplanes?

Distribute THE BIRDS STARTED IT (Student Handouts 1, 2, 3, and 4).



Cut sheets apart, stack, and staple to form a book. Read the story or have students read it. Discuss questions similar to the following:

1. What is meant by the title, "The Birds Started It"?
2. What were the first things that people tried to make fly?
3. Describe some of the different aircraft that people flew.
4. What is a space shuttle?

ACTIVITY 2: MAKING A PRE-KITE

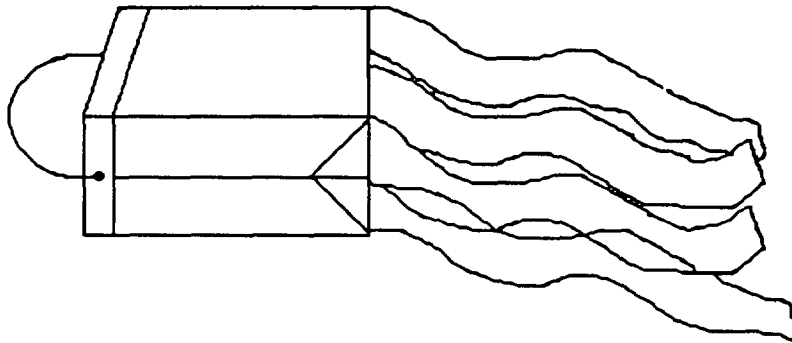
Tell students that the Chinese invented the first kite about 2000 years ago. Ask students a question similar to the one that follows and wait for several student responses.

Question: Why do you think that people have been interested in flying kites for at least 2000 years?

Possible Answers: People wish they could fly kites. People were interested in how things fly. Flying kites is fun. Kites teach you how things fly.

Explain to students that some people think that the first kites were huge, man-carrying kites that lifted people high enough to see what their enemies were doing.

Construct a pre-kite. Decorate a paper bag. Add tissue paper streamers. Punch holes in both sides near the open end of the bag. Attach string to form a loop.



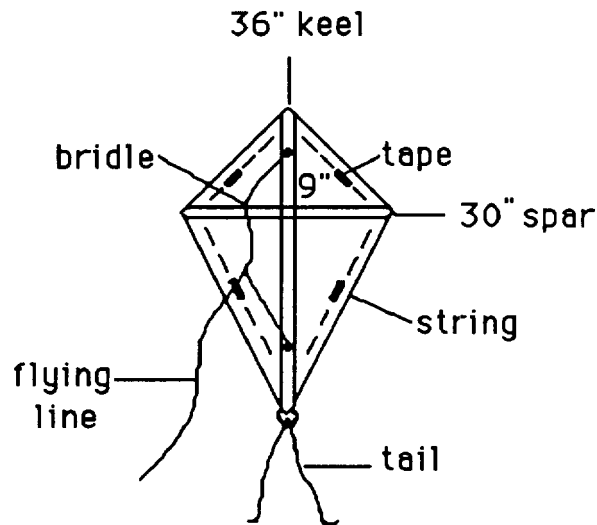
Take students to an outdoor play area. Let students observe the pre-kite fill with air and float as they hold the string and run. Allow ample time for students to experiment.

Return to the classroom and ask students to discuss questions such as the following:

1. Why do you think some kites fly better than others?
Answer: Some kites are lighter and balanced better.
2. Why do you think kites fly better on some days than on other days?
Answer: Wind conditions are more favorable.

ACTIVITY 3: MAKE A KITE

Make a drawing similar to the one that follows and introduce the vocabulary associated with kite construction.



Be sure that the drawing is displayed where students can see it.

Tell students that there are six steps in making a kite. Write these steps where students can see them. (Wording can be adjusted for younger students.)

1. Glue 30" spar about 9" from top of 36" keel.
2. Cut notches in each end of the spar and keel.
3. Run string through notches in spar and keel. Tie string ends.
4. Lay frame on lightweight plastic or tissue paper. Fold plastic or tissue paper over string and tape or glue.
5. Cut bridle 54" long. Attach bridle as shown in the drawing.
6. Tie flying line to bridle as shown in the drawing.
7. Tie the tail to the bottom of the keel.

Show how a kite is made by reading each step and demonstrating how that action is carried out.

Leave the drawing and the six steps in full view of students and distribute kite-making supplies. Explain the importance of following directions one step at a time.

ACTIVITY 3 (Continued)

When kites are completed, take students to a large outdoor area and conduct a kite-flying contest. Give prizes for the highest, fastest, and/or most durable kite.

NOTE: The kite must be lightweight or it will not fly. This is true of all things that fly.

Extended Activities

- Have students write a poem or short story about how it feels when flying a kite.
- Have students pretend that they are kite makers. Have them design, draw, and name several different types of kites.
- Have a group or groups of students use library resources to research the invention, development, and/or uses of kites. Have students report their findings to the class.
- Write Topic 1 vocabulary words in the Fantastic Flight Dictionary.

TOPIC 2: MILESTONES PRIOR TO 1903

The activities, suggested materials, grade level, and related subject areas for each activity are summarized below.

| <u>ACTIVITY</u> | <u>MATERIALS NEEDED</u> | <u>GRADE LEVELS SUBJECT</u> |
|--|---|--|
| 4. First People and First Aircraft | Student Handouts 5, 6, and 7 Fantastic Flight Dictionary | Grades K-3 social studies science |
| 5. Match People and Accomplishments | Student Handouts 8, 9, and 10 | Grades 2-3 language arts social studies science |

ACTIVITY 4: FIRST PEOPLE AND FIRST AIRCRAFT

Direct students' attention to early flight. Stir their interest by asking questions such as the following:

1. When did man first become interested in flight? How do we know?
2. What aircraft did man fly first?
3. How do you think the first man to fly felt?

Explain to the students that over 470 years ago an Italian artist, architect, and scientist named Leonardo da Vinci made the world's first known drawings of the parachute and the helicopter. None of the flying machines he drew were ever built.

Distribute Student Handout 5. Complete per directions.

Further explain that 200 years ago Joseph Montgolfier came up with the idea for the balloon as he watched smoke and sparks rise from his fireplace. The birth of the balloon and lighter-than-air flight came as a result of Montgolfier experimenting with a paper bag held over a lighted fire. The bag filled with warm air causing it to rise into the air. Soon Montgolfier attached a basket under his balloon. First he flew animals in the basket, and finally came the 25-minute historic flight of two men. This historic flight is recorded as "man's first flight."

Distribute Student Handout 6. Complete per directions.

Impress students with the fact that man continued his efforts, despite many failures, to become airborne. Count Ferdinand Von Zeppelin built the world's first successful dirigible 88 years ago. The dirigible was a floating aircraft with an attached motor that made it steerable. The Zeppelin was the first aircraft to be used for public transportation. It made the first successful flight across the Atlantic Ocean.

ACTIVITY 4 (Continued)

Distribute Student Handout 7. Complete per directions.

Determine major advantages of the Zeppelin dirigible over the Montgolfier balloon. (1. The Zeppelin could transport more passengers than the balloon. 2. An attached motor made it steerable.)

Extended Activities

- Have students pretend they are Leonardo da Vinci. Have them develop a drawing of their own design for the first mass transport spacecraft.
- Have students pretend they were passengers in Montgolfier's balloon. Ask them to write stories about the first balloon flight and describe what they saw while aloft. Ask them to describe their feelings about being one of the first people to fly. Have them illustrate their stories.

An alternative for K-1 would be to write a class experience chart or class story.

- Seek out and report on other things Leonardo da Vinci is famous for.
- Divide the class into three groups. Ask each group to select one of the following topics. Tell students to use library resources to further research the topic and write a short report. Ask each group to select a group reporter to report findings to the entire class.

Leonardo da Vinci
Montgolfier/Balloons
Zeppelin/Dirigibles

An alternative for K-1 would be to select additional books and stories to read to the students.

ACTIVITY 4 (Continued)

- Write Topic 2 vocabulary words in Fantastic Flight Dictionary.
- Write stories using Topic 1 and Topic 2 vocabulary words.

ACTIVITY 5: MATCH PEOPLE AND ACCOMPLISHMENTS

Distribute Student Handout 8. Locate names of people and aircraft important in the history of aerospace.

Distribute Student Handout 9. Match aerospace hero to the accomplishment.

Answers: 1. d 2. c
 3. a 4. e

Distribute Student Handout 10. Match the famous aircraft to the inventor.

Answers: 1. Chinese/kite
 2. da Vinci/winged drawing
 3. Zeppelin/dirigible
 4. Montgolfier/balloon

TOPIC 3: HEROES AND HEROINES: 1903 TO PRESENT

The activities, suggested materials, grade level, and related subject areas for each activity are summarized below.

| <u>ACTIVITY</u> | <u>MATERIALS NEEDED</u> | <u>GRADE LEVELS</u> <u>SUBJECT</u> |
|---|--|---|
| 6. First Real Flight | Student Handout 11 drawing paper map of the United States | Grades K-3 language arts social studies |
| 7. Planned Writing Outline and Biography of Heroes/Heroines | Single-Concept Learning Packets: "Amelia Earhart," "Wright Brothers," Charles Lindbergh," and "Robert Goddard" (These are free from Civil Air Patrol. See Teacher Resource Section for address.) Student Handouts 12 and 13 | Grades 2-3 language arts social studies |
| 8. Time Line | Student Handout 14 Single-Concept Poster Packet: "Chronology of Aerospace Events" (These are free from Civil Air Patrol. See Teacher Resource Section for address.) Fantastic Flight Dictionary Student Handouts 5, 6, 7, 11, 15, 16, and 17 | Grades 1-3 mathematics social studies |

ACTIVITY 6: FIRST REAL FLIGHT

Direct students' thinking to the first real flight by asking questions such as the following:

1. What do you think the first airplane to fly looked like?
Answer: large, awkward, and unstreamlined
2. What kind of materials do you think was used to build the plane?
Answer: lightweight wood and fabric
3. many people were able to fly in it?
Answer: one
4. How long do you think it stayed in the air?
Answer: less than a minute
5. Do you think the builders had problems or failures before they finished building the plane? Why?
Answer: Builders had problems because they were developing the first aircraft.

Distribute Student Handout 11. Complete per directions.

Explain to the students that Orville and Wilbur Wright built the first heavier-than-air aircraft. It had an engine and could be controlled. They named their small, flimsy, wood and cloth airplane The Flyer. They flew The Flyer at Kitty Hawk, North Carolina, in 1903. The flight was less than one minute.

Extended Activities

- Read or tell students about the life and accomplishments of Orville and Wilbur Wright.
- Display a map of the United States. Help students locate their hometown and Kitty Hawk, N.C. Discuss the location of Kitty Hawk in relation to the students' hometown.
- Distribute drawing paper. Ask students to draw a picture of the Wright Brothers at Kitty Hawk with The Flyer.

ACTIVITY 6 (Continued)

- Discuss the failures and successes of Orville and Wilbur Wright. Ask students to brainstorm ways they can learn from their failures while at play (bike riding) or in the classroom (learning math facts).

ACTIVITY 7: PLANNED WRITING OUTLINE BIOGRAPHY OF HEROES/HEROINES

Direct the students' thoughts to facts about themselves by asking questions such as the following:

1. What is your name and age?
2. When and where were you born?
3. What are the names of your family members?
4. What thing do you like to do most?

Introduce a planned writing outline. Write an outline on the board such as the following:

I. Important Facts About Yourself

- A. Your name
- B. Your age
- C. One thing you like to do

II. Your Own History

- A. Where you were born
- B. Date of your birth
- C. Other places you have lived

III. Introduce Your Family

- A. Give parents' names
- B. Tell names of brothers and sisters
- C. Mention other relatives or pets

ACTIVITY 7 (Continued)

Inform students that the outline will be used to write a story about themselves. After studying the planned outline, ask students to copy the outline from the board. Have students write simple sentences for each of the outline items. Have students read their personal stories to the class.

Explain to the students that stories about a person's life are called biographies. Tell the students that they are going to develop a planned outline for writing biographies of famous aviation and space personalities. Ask that they use at least three major headings with at least two subheadings under each. Ask students to consider the following questions as they develop the outline:

1. When and where was the personality born?
2. How old would this person be today?
3. What did this person's parents do?
4. Did this person's parents have an effect on his/her life?
5. How and where did this person learn to fly?
6. What great contributions did this person make to aviation or space?
7. What kind of failures did this person experience?

Ask students to use their planned outline to write a biography about their favorite aviation or space hero or heroine. Suggest a list of aviation and space heroes and heroines such as the following:

Orville and Wilbur Wright
Amelia Earhart
Charles Lindbergh
Robert Goddard
Neil Armstrong
Sally Ride
Christa McAuliffe

ACTIVITY 7 (Continued)

Extended Activities

- Develop an aviation and space hero/heroine bulletin board. Display students' biographies of famous aviation and space heroes/heroines. Ask students to develop drawings that depict accomplishments that made each hero/heroine famous.
- Divide the class into six groups. Ask each group to select a famous aviation or space hero/heroine. Tell them to brainstorm and develop a creative presentation (show and tell, picture presentation, or play) as a way to inform the class about their selected personality.
- Distribute Student Handout 12. Complete per directions.

| | | |
|----------|--------------|---------------|
| Answers: | <u>Down</u> | <u>Across</u> |
| | 1. Yeager | 1. Wright |
| | 2. Lindbergh | 2. Goddard |
| | 3. Ride | 3. Earhart |

- Ask students to create an acrostic, a poem in which the first letter of each line forms a name or message, using one of the following words:

| | | |
|--------|--------|--------|
| Wright | glider | rocket |
| kite | Amelia | Yeager |

Example:

| | |
|---|---------------------|
| B | Buoyant bag |
| A | Ascending upward |
| L | Light, wind |
| L | Lift, liberate |
| O | Onward, observation |
| O | Oblate shape |
| N | Natural |

- Distribute Student Handout 13. Complete per directions.
Answer: Goddard was the Father of Rocketry.

ACTIVITY 8: TIME LINE

Direct the students' attention to where they fit in aviation and space history. Ask thought-provoking questions such as the following:

1. What major aviation and space events have taken place since you were born?
2. Name some of the major aviation and space events that your parents may have seen.
3. Did the Wright brothers fly before your parents were born, your grandparents, or great-grandparents?
4. During what time period did the greatest number of aviation and space achievements take place?
5. How long has it been since the Wright brothers' first powered, sustained and controlled flight?

Ask students to brainstorm and compile a list of the aviation/space events they think were major milestones to the developments we have today. Write the list on the board. Ask that they develop reasons for their selections. Limit the list to ten events. Using the list and Student Handout 14, ask students to develop a time line of major aviation and space achievements. Complete Student Handout 14 per directions.

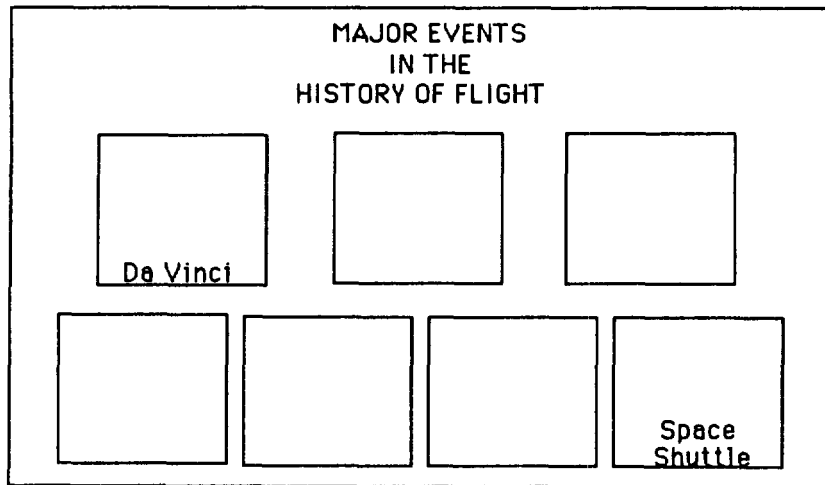
Extended Activities

- Develop a "Major Events in the History of Flight" bulletin board. Divide the class into seven groups. Assign each group a major event. Give each group a copy of one of the major events as listed:
 - Student Handout 5: Leonardo da Vinci
 - Student Handout 6: Montgolfier Balloon
 - Student Handout 7: Zeppelin Airship
 - Student Handout 11: Wright Brothers
 - Student Handout 15: Jet Service
 - Student Handout 16: Apollo 11
 - Student Handout 17: Space Shuttle

ACTIVITY 8 (Continued)

Grades 2-3

Ask each group to use library resources to research information and write a one-page report on their assigned major event. Ask each group to select a reporter to report findings to the class. Display the completed handout and the one-page report on the bulletin board.



Kindergarten-Grade 1

Use the same bulletin board as grades 2-3. Distribute Student Handouts 5, 6, 7, 11, 15, 16, and 17 one at a time. Discuss each major event in the history of flight. Color each handout and display on the bulletin board.

- Develop an aviation and space current events bulletin board. Have students design, color, and cut out aircraft and rockets to border the bulletin board. Ask students to collect news articles about aviation and space events. Have students report their news. Display the articles on the board.

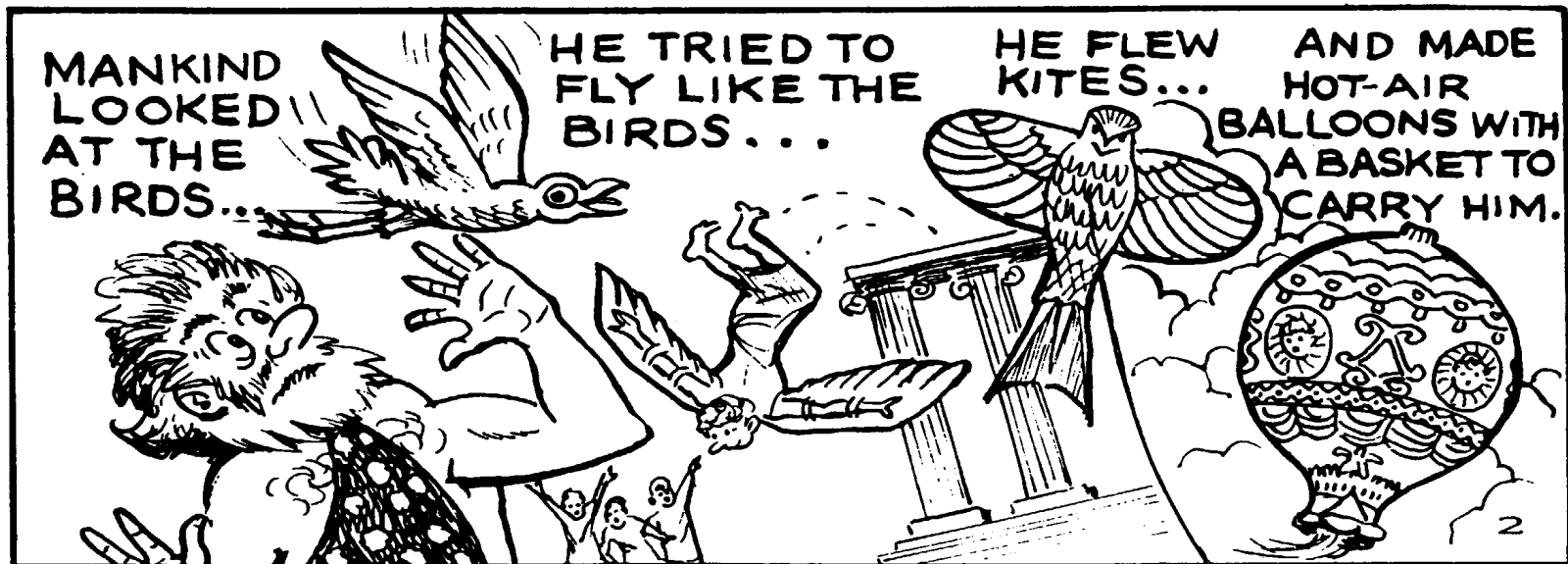
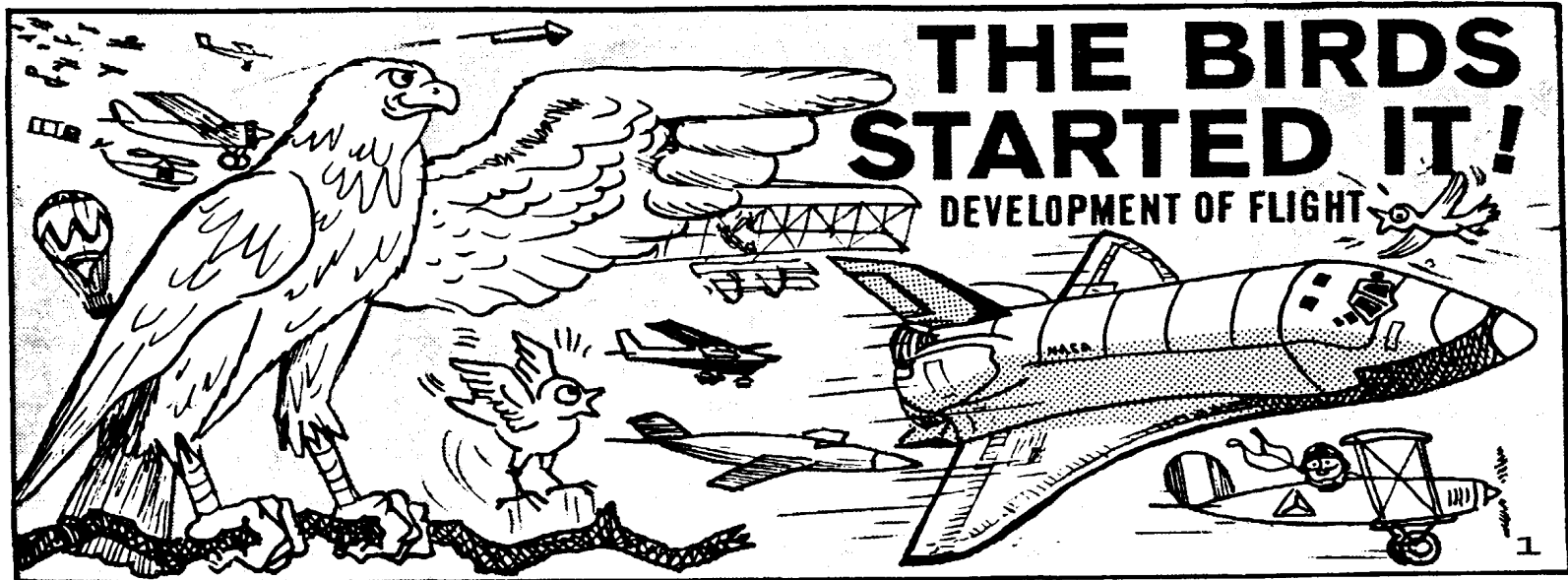


ACTIVITY 8 (Continued)

- Write Topic 3 vocabulary words in the Fantastic Flight Dictionary.

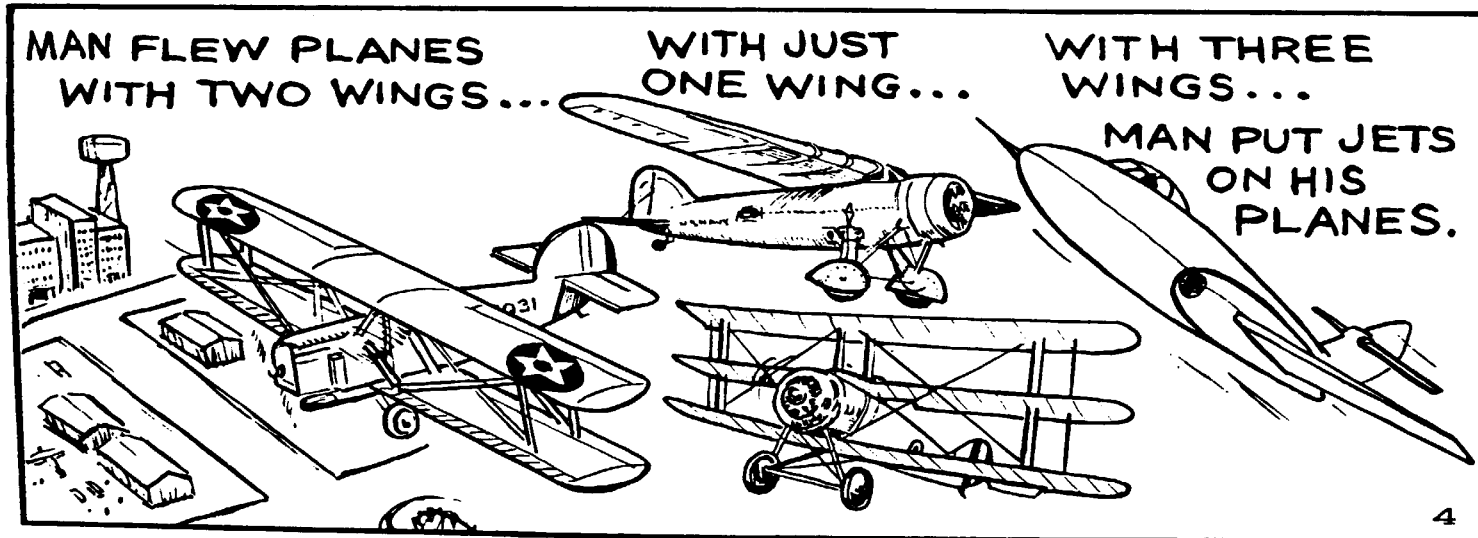
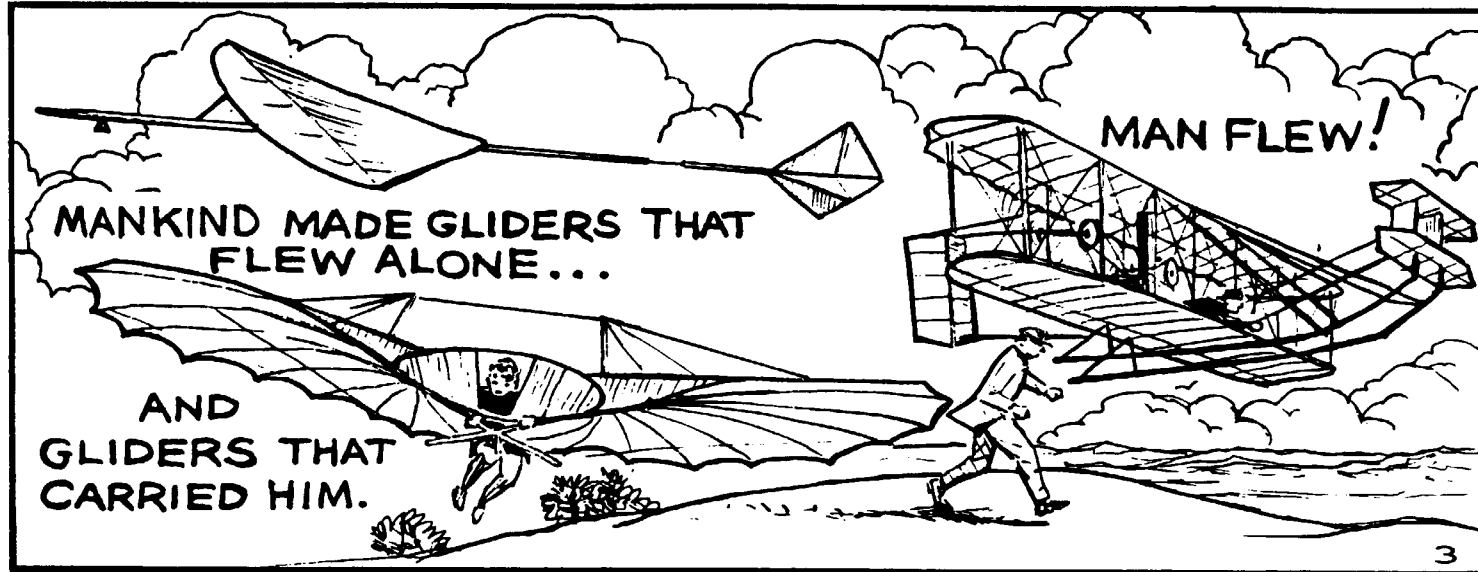
UNIT 1 ACTIVITY 1

STUDENT HANDOUT 1



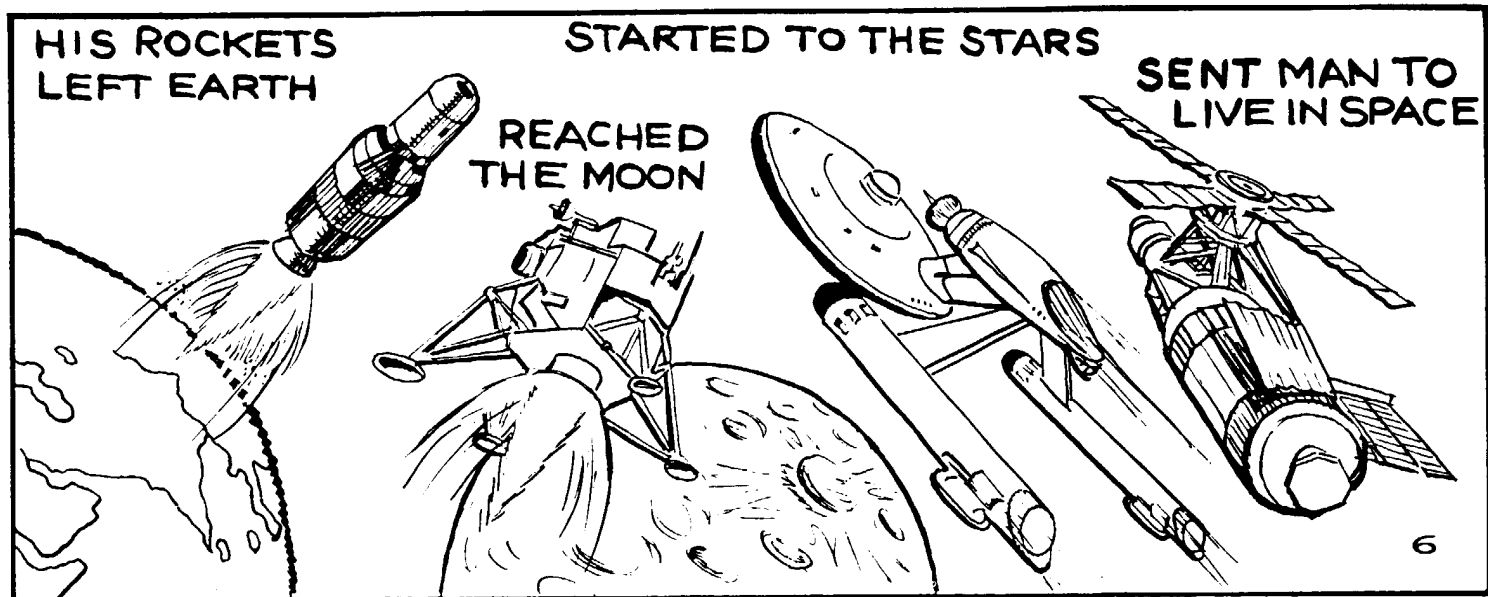
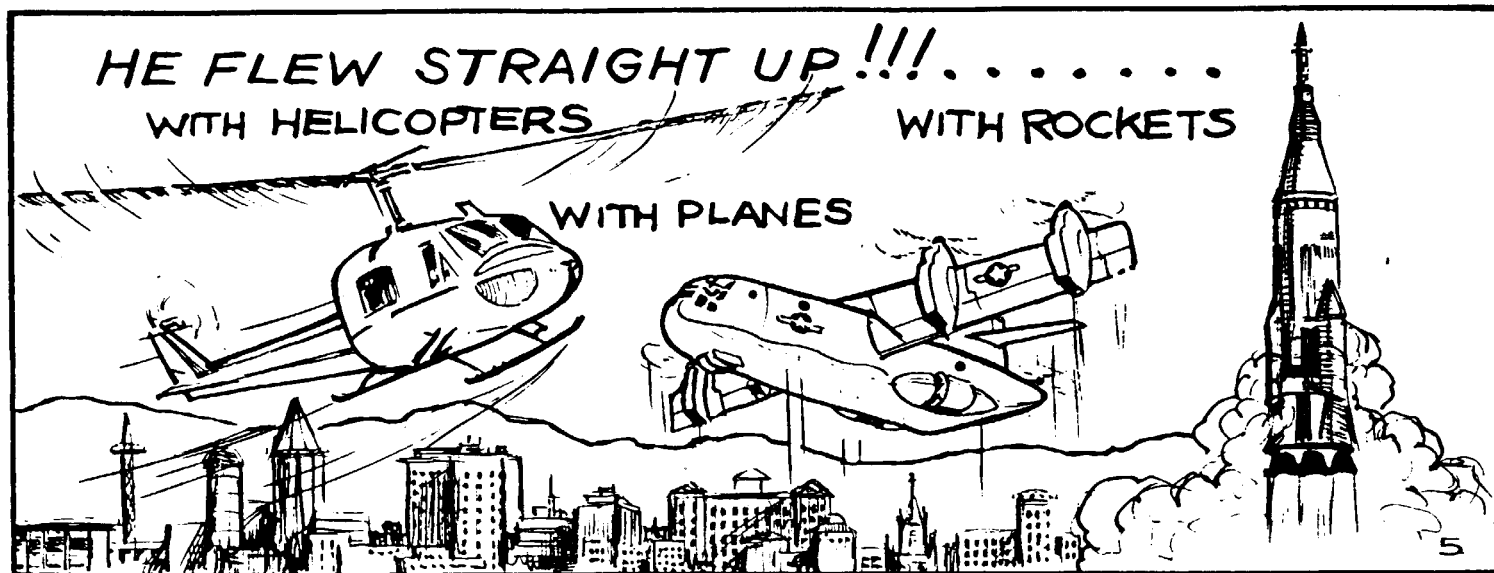
UNIT 1 ACTIVITY 1

STUDENT HANDOUT 2

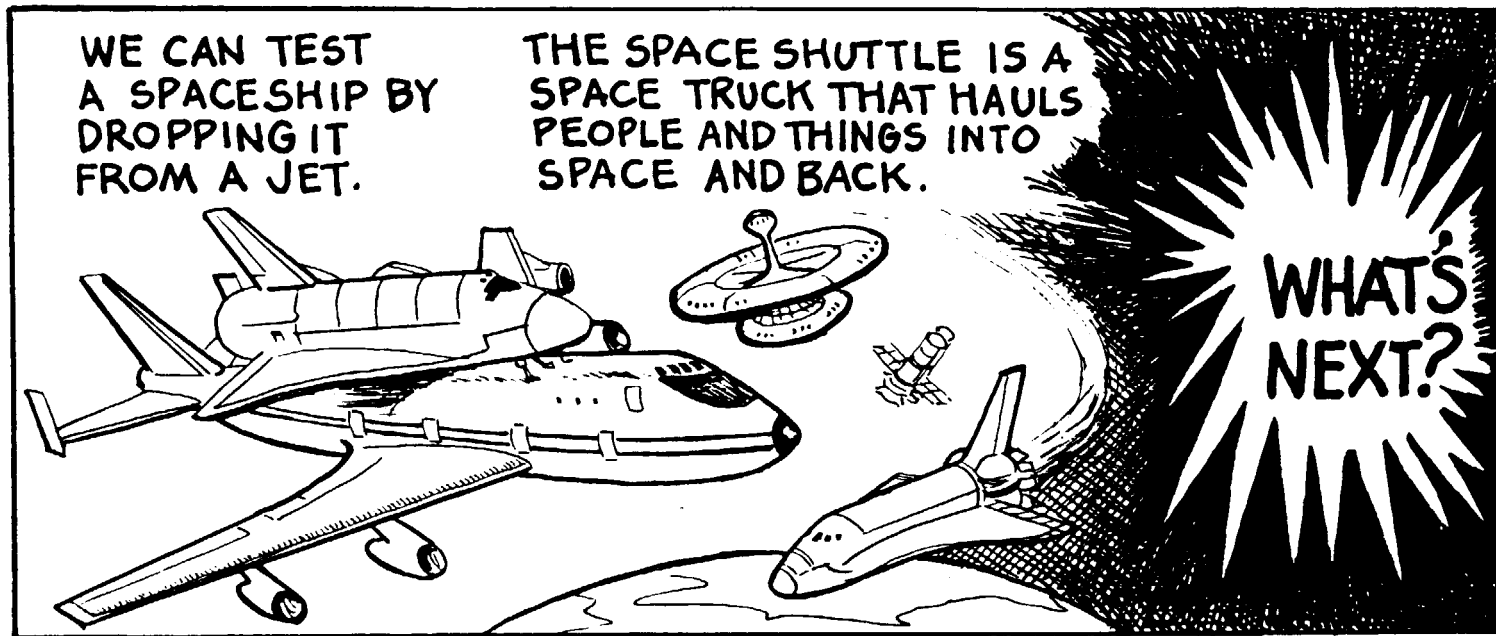


UNIT 1 ACTIVITY 1

STUDENT HANDOUT 3



UNIT 1 ACTIVITY 1
STUDENT HANDOUT 4



UNIT 1 ACTIVITY 4

STUDENT HANDOUT 5

Directions: Read and color.



LEONARDO DA VINCI

Leonardo da Vinci was an artist. He drew the world's first known designs of the parachute and the helicopter.

UNIT 1 ACTIVITY 4

STUDENT HANDOUT 6

Directions: Read and color



MONTGOLFIER BALLOON

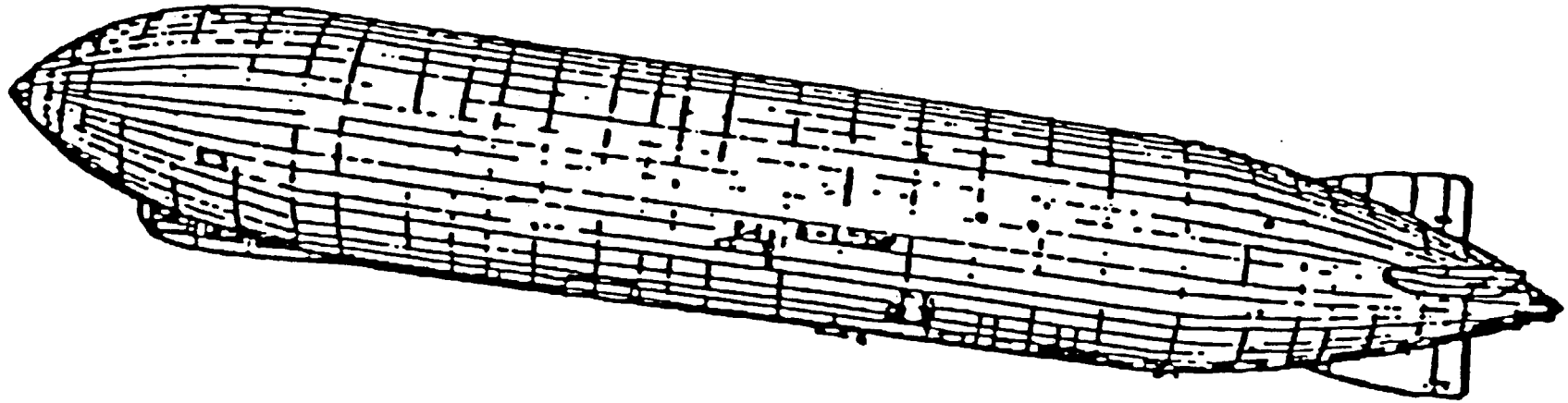
1783

Man's "first flight" was made in a Montgolfier balloon. The flight lasted 25 minutes.

UNIT 1 ACTIVITY 4

STUDENT HANDOUT 7

Directions: Read and draw a countryside scene for the Zeppelin.



ZEPPELIN AIRSHIP

1900

Count Ferdinand Von Zeppelin built the first aircraft for public use. It made the first successful flight across the Atlantic Ocean.

UNIT 1 ACTIVITY 5

STUDENT HANDOUT 8

FAMOUS PEOPLE AND AIRCRAFT

FIND: Balloon Kite Da Vinci
 Chinese Parachute Zeppelin
 Dirigible Montgolfier

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B | A | L | L | O | O | N | A | G | J | Z | T |
| Y | M | O | N | T | G | O | L | F | I | E | R |
| O | E | W | U | W | E | N | G | R | K | P | T |
| A | N | R | R | E | L | G | I | E | T | P | Y |
| C | H | I | N | E | S | E | Y | R | L | E | W |
| A | O | G | R | R | D | E | I | L | C | L | Y |
| E | S | H | Y | B | A | L | L | O | O | I | B |
| B | O | T | K | M | V | Y | I | C | K | N | O |
| A | J | I | I | A | I | W | T | K | S | T | B |
| O | M | S | N | L | N | L | O | I | A | N | Y |
| E | P | A | R | A | C | H | U | T | E | I | O |
| D | I | R | I | G | I | B | L | E | L | W | W |

UNIT 1 ACTIVITY 5

STUDENT HANDOUT 9

Directions: Match accomplishments to name of aerospace hero.

- | | |
|----------------------------|---|
| 1. _____ Chinese | a. Man's first flight |
| 2. _____ Leonardo da Vinci | b. Made first powered, controlled, and sustained flight |
| 3. _____ Montgolfier | c. World's first designer of the helicopter and the parachute |
| | d. Invented the kite |
| 4. _____ Zeppelin. | e. Perfected the dirigible for public use |

UNIT 1 ACTIVITY 5

STUDENT HANDOUT 10

Directions: Color, cut, and paste the picture of the famous aircraft above the name of the inventor.

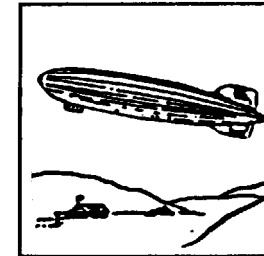
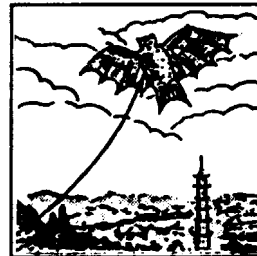
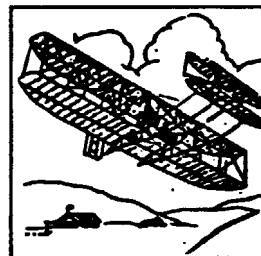
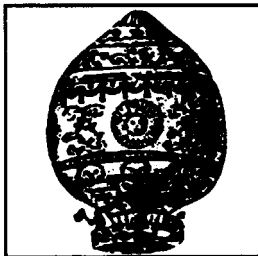
1. Chinese

2. Leonardo da Vinci

3. Zeppelin

4. Montgolfier

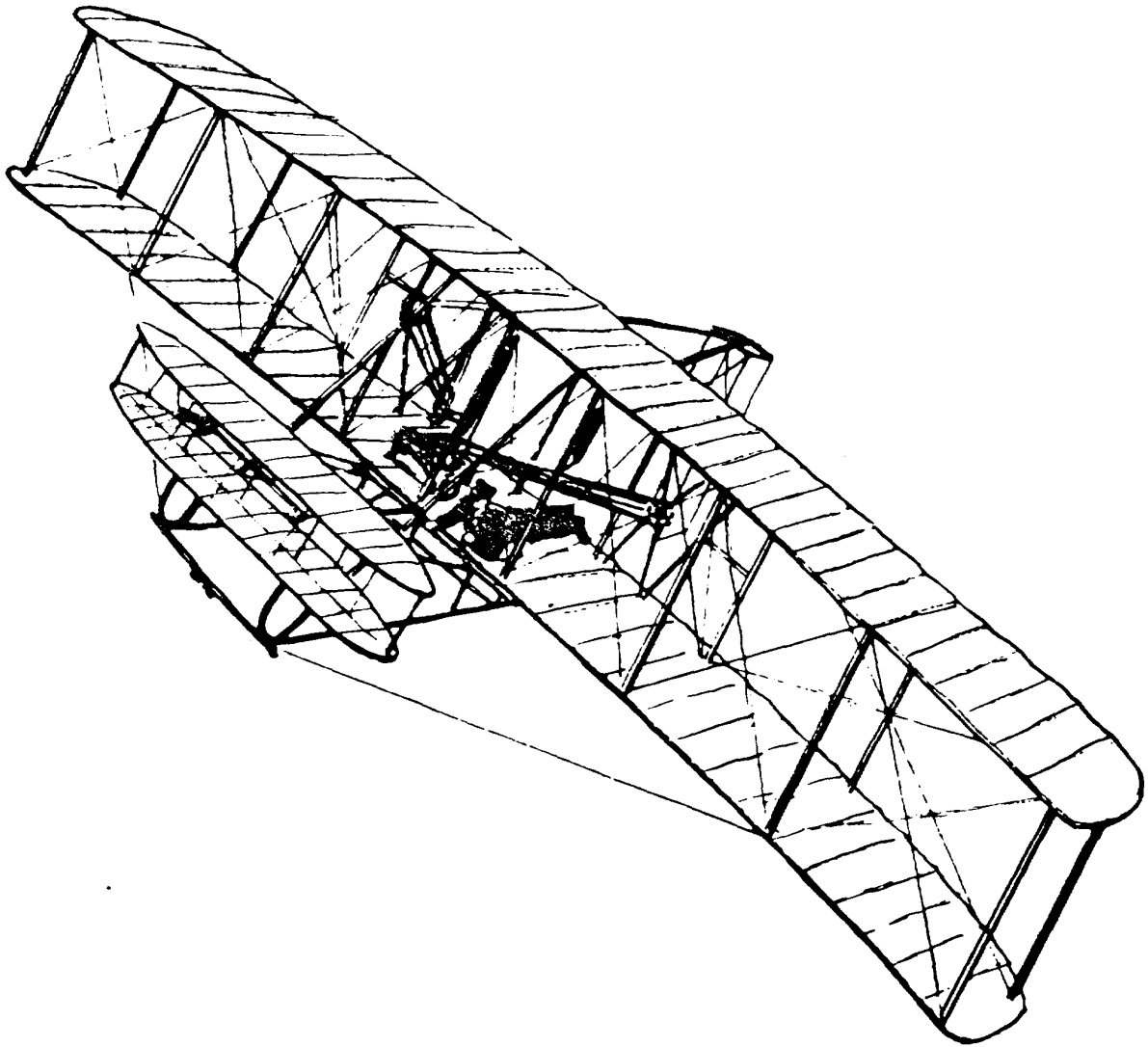
CUT-----



UNIT 1 ACTIVITY 6

STUDENT HANDOUT 11

Directions: Read the story. Color The Flyer.



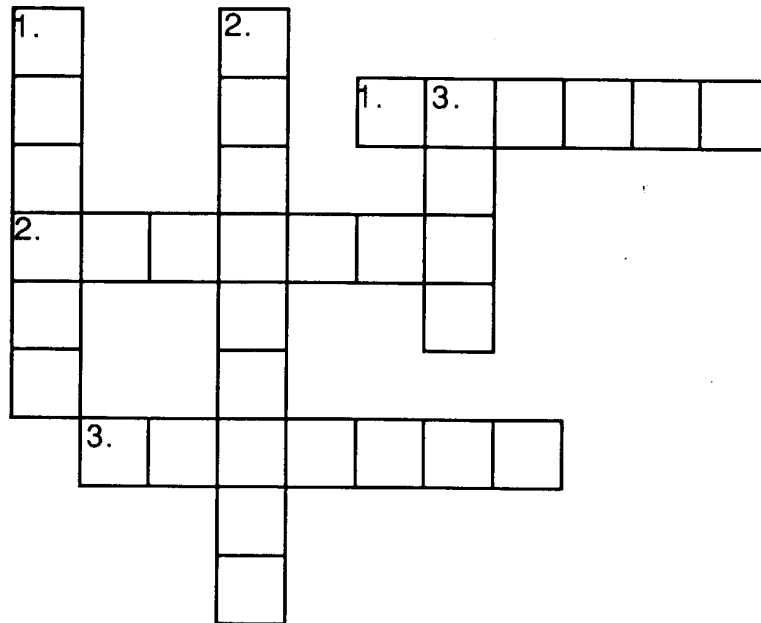
THE FLYER
1903

Orville and Wilbur Wright flew the first powered and controlled flight in Flyer 1. Real flight was born.

UNIT 1 ACTIVITY 7

STUDENT HANDOUT 12

FAMOUS AVIATION AND SPACE PERSONALITIES



WORD BANK

| | |
|---------|-----------|
| Goddard | Earhart |
| Yeager | Lindbergh |
| Wright | Ride |

Down

1. First to fly faster than the speed of sound.
2. First man to fly solo across the Atlantic.
3. First United States woman in space.

Across

1. Flew the first powered, controlled, and sustained heavier-than-air aircraft.
2. Father of rocketry.
3. First aviatrix to fly solo across the Atlantic.

UNIT 1 ACTIVITY 7

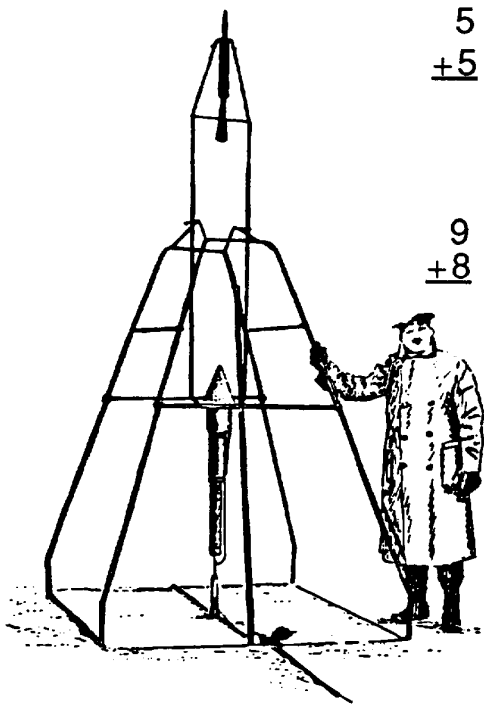
STUDENT HANDOUT 13

Directions: Add or subtract. Use secret code to find secret message.

Secret Code:

| | | | | | | | | |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| $\frac{5}{a}$ | $\frac{6}{c}$ | $\frac{7}{d}$ | $\frac{8}{e}$ | $\frac{9}{f}$ | $\frac{10}{g}$ | $\frac{11}{h}$ | $\frac{12}{k}$ | $\frac{13}{o}$ |
| $\frac{14}{r}$ | $\frac{15}{s}$ | $\frac{16}{t}$ | $\frac{17}{w}$ | $\frac{18}{y}$ | | | | |

SECRET MESSAGE



| | | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 5 | 6 | 3 | 10 | 9 | 7 | 13 |
| <u>+5</u> | <u>+7</u> | <u>+4</u> | <u>-3</u> | <u>-4</u> | <u>+7</u> | <u>-6</u> |

| | | | | | | |
|-----------|-----------|-----------|--|-----------|-----------|-----------|
| 9 | 10 | 8 | | 8 | 6 | 16 |
| <u>+8</u> | <u>-5</u> | <u>+7</u> | | <u>+8</u> | <u>+5</u> | <u>-8</u> |

| | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|
| 17 | 11 | 9 | 8 | 11 | 9 |
| <u>-8</u> | <u>-6</u> | <u>+7</u> | <u>+3</u> | <u>-3</u> | <u>+5</u> |


| | |
|-----------|-----------|
| 6 | 17 |
| <u>+7</u> | <u>-8</u> |

| | | | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 8 | 4 | 13 | 12 | 15 | 7 | 6 | 9 |
| <u>+6</u> | <u>+9</u> | <u>-7</u> | <u>-0</u> | <u>-7</u> | <u>+9</u> | <u>+8</u> | <u>+9</u> |


UNIT 1 ACTIVITY 8
STUDENT HANDOUT 14

Directions: Cut out pictures. Glue the pictures in chronological order on a piece of plain paper.
Write the age of grandmother, dad, and yourself.

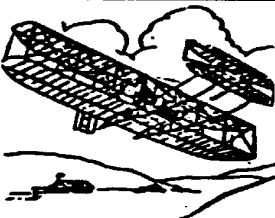
400 Years Ago



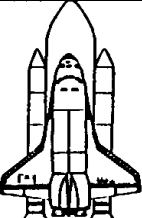
200 Years Ago



85 Years Ago



8 Years Ago



20 Years Ago



88 Years Ago



30 Years Ago



____ Age



Grandmother

____ Age



Father

____ Age

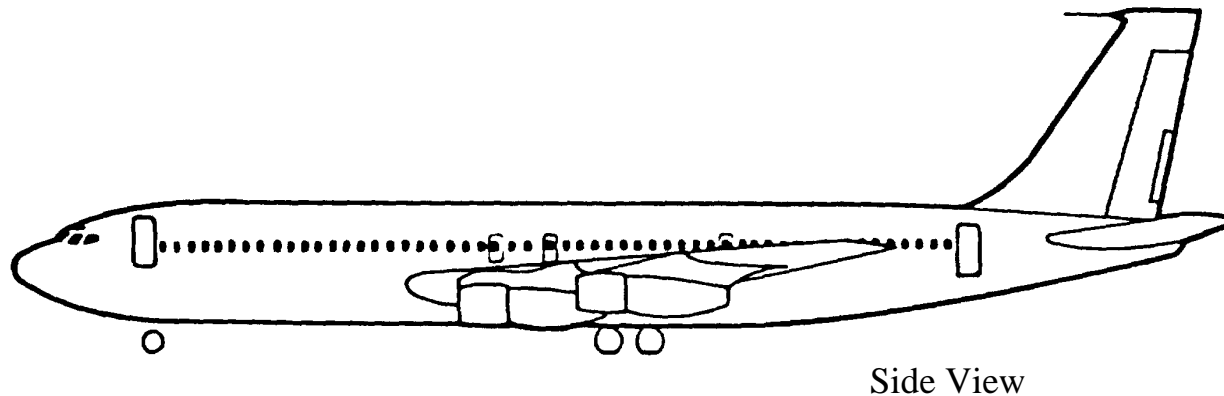
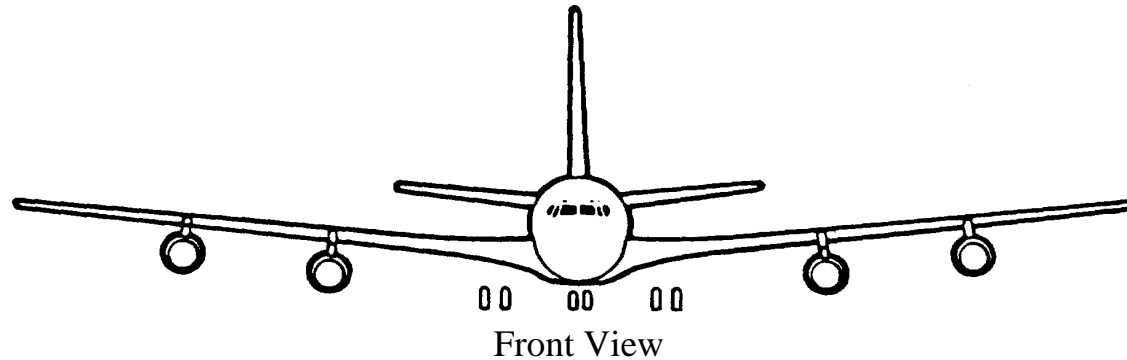


Your Name

UNIT 1 ACTIVITY 8

STUDENT HANDOUT 15

Directions: Read the story. Color the picture.



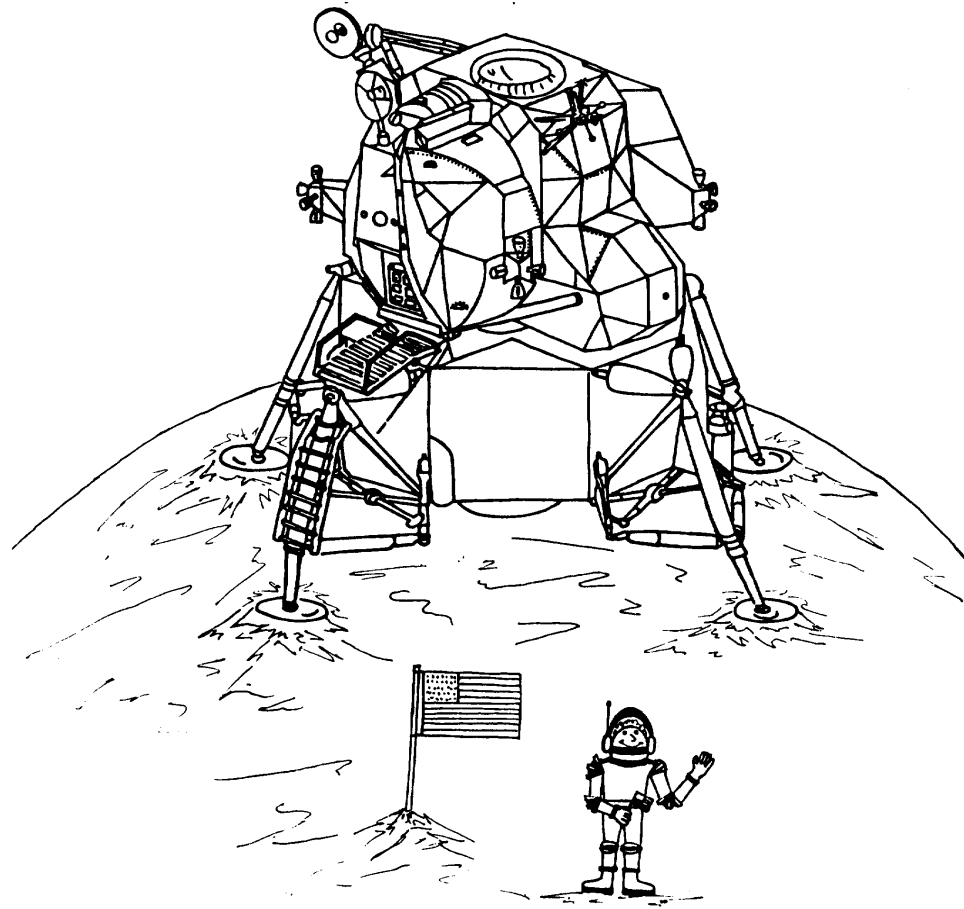
1958 JET SERVICE

Airlines flew the first passenger jet in 1958. For the first time, man could travel 600 miles per hour.

UNIT 1 ACTIVITY 8

STUDENT HANDOUT 16

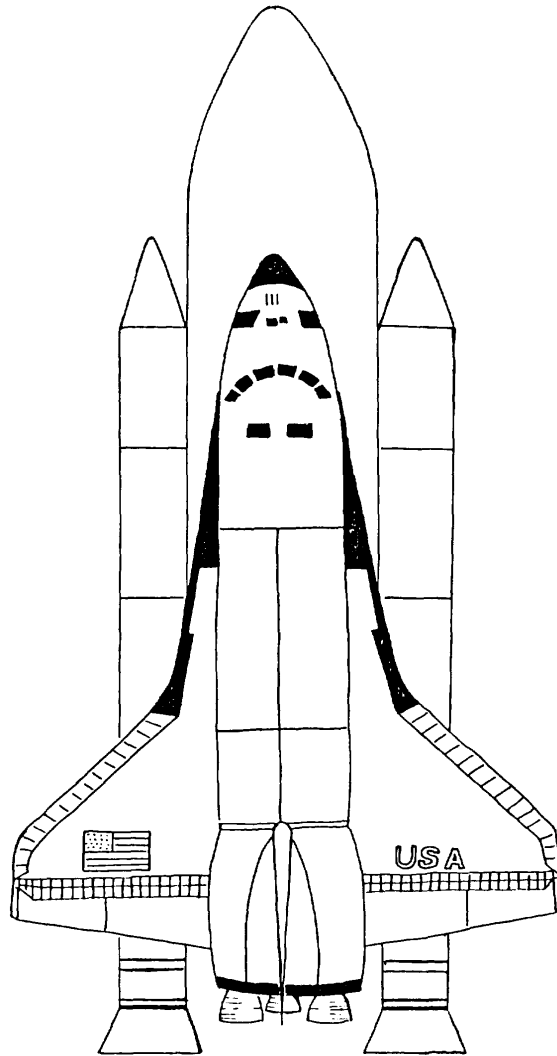
Directions: Read the story. Color the picture.



APOLLO 11

Apollo 11 landed on the moon on July 20, 1969. Neil Armstrong was the first man to walk on the moon.

UNIT 1 ACTIVITY 8
STUDENT HANDOUT 17
Directions: Read the story.



Color the picture.

SPACE SHUTTLE

The first space shuttle was launched in 1981. A space shuttle has three main parts: the orbiter, the solid rocket boosters, and the external fuel tank.

UNIT 2: KINDS AND USES OF AIRCRAFT

PURPOSE OF UNIT 2

The purpose of Unit 2 is to introduce students to the kinds and uses of aircraft. Specifically, students should:

1. identify different kinds of transportation for use on land, air, and water;
2. define the term "aircraft";
3. recognize the four different groups of aircraft;
4. demonstrate that air has weight;
5. demonstrate that cool air is heavier than warm air;
6. recognize the three users of aircraft: military, airlines, and general; and
7. explore the many uses of aircraft.

MAJOR MESSAGES IN UNIT 2

- Most aircraft are useful, but some are for sport or fun.
- Aircraft both directly and indirectly help each of us daily in some way.

BACKGROUND INFORMATION FOR UNIT 2

Unit 2 consists of 2 topics:

TOPIC 1: FOUR GROUPS OF AIRCRAFT

TOPIC 2: THREE USERS OF AIRCRAFT

Topic 1 divides the many kinds of aircraft into four groups. Emphasis is placed on the differences of each group.

Topic 2 takes a look at the different users of aircraft: military, airlines, and general. The many ways in which the users use aircraft are further explored in Topic 2.

VOCABULARY WORDS FOR UNIT 2

Topic 1

aircraft
rotocraft
lighter than air
glider
airplane
balloon
blimp
dirigible
helicopter
sailplane
hang glider
gyrocopter

Topic 2

military
airline
general
crop duster

TOPIC 1: FOUR GROUPS OF AIRCRAFT

The activities, suggested materials, grade level, and related subject areas for each activity are summarized below.

| <u>ACTIVITY</u> | <u>MATERIALS NEEDED</u> | <u>GRADE LEVEL SUBJECT</u> |
|------------------------|--|---|
| 1 . Ways to Travel | magazines bulletin board | Grades K-1 social studies mathematics |
| 2. What Is an Aircraft | aviation magazines Student Handouts 1 and 2 | Grades K-1 social studies mathematics |
| 3. Lighter than Air | BALLOONS AND BLIMPS, Student Handouts 3, 4, and 5 string, dowel, 2 balloons Little Thinker cassette tape: Ways to Travel: A Balloon Trip (See Teacher Resource Section [Jerome Enterprises, Inc.] for address.) drawing paper, crayons tissue paper, gluestick or rubber cement, coffee can (ends removed), single burner camp stove, string, masking tape round balloons, newspaper, glue, water, string, fruit baskets (boxes), paint | Grades K-3 science language arts |

TOPIC 1 (Continued)

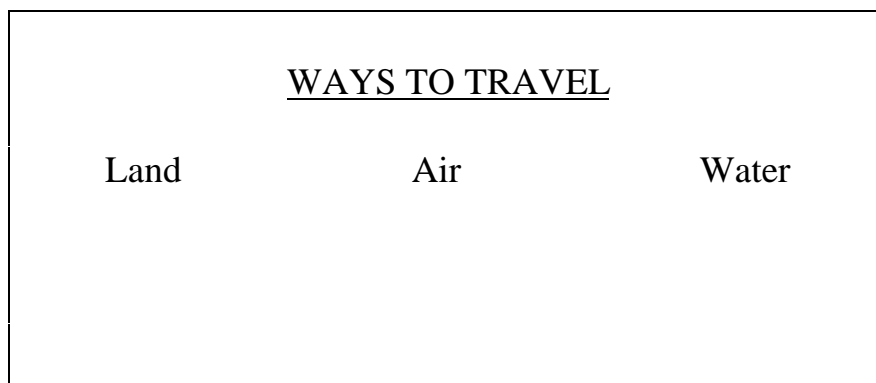
| <u>ACTIVITY</u> | <u>MATERIALS NEEDED</u> | <u>GRADE LEVEL SUBJECT</u> |
|------------------------|---|---|
| 4. Rotocraft | Student Handout 6 white drawing paper | Grades K-3 language arts art |
| | Student Handout 7 | |
| 5. Glider | 8 1/2" X 11" white paper | Grades K-3 science language arts art |
| | wood glider kits (See Teacher Resource Section for free or inexpensive glider kits.) | |
| 6. Airplanes | Student Handouts 8, 9, 10, 11, and 12 | Grades K-3 language arts mathematics |
| | Fantastic Flight Dictionary | |

ACTIVITY 1: WAYS TO TRAVEL

Begin by directing students' attention to different kinds of transportation. Create an interest by asking questions such as the following:

1. Before the car was invented, what were some ways man traveled from one place to another?
2. What are some ways we travel today?
3. What is the fastest way to travel today? What is the slowest?

Explain that we can travel on land, on air, and on water. Point out that there are many kinds of land vehicles, water vehicles, and air vehicles. Ask students to collect pictures of ways to travel from magazines, books, and newspapers. Use pictures to develop a bulletin board. Make title and caption cards per diagram.



Discuss pictures of different vehicles that the students have collected. Ask students to sort the pictures into three groups: land vehicles, air vehicles, and water vehicles. Display the students' pictures under the appropriate bulletin board caption.

ACTIVITY 2: WHAT IS AN AIRCRAFT

Direct the students' attention to the word "aircraft." Arouse student interest by asking the following questions:

Questions: What is air?
 What is a craft?
 What is an aircraft?

Answers: air: the earth's immediate atmosphere (air)
 craft: boat, ship; a vehicle
 aircraft: a vehicle that travels in the air

Wait for a variety of responses. After the discussion, help students formulate a definition for the word "aircraft."

Definition: An aircraft is any machine or device capable of moving through the air.
 An aircraft can be non-motorized or motorized.

Distribute aviation magazines. Ask students to cut out pictures of different aircraft (airplanes, balloons, helicopters, and gliders). Have students share their pictures with the group. Develop an awareness of aircraft differences by asking questions such as the following:

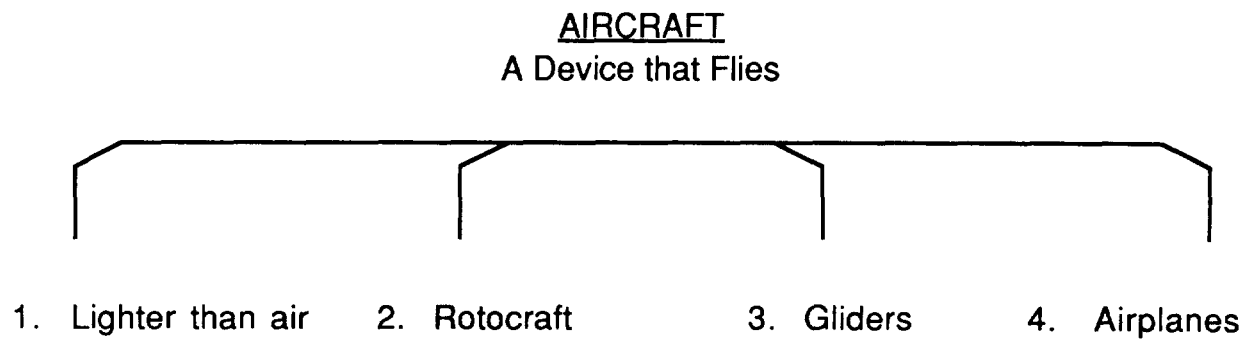
1. Does this aircraft have wings?
2. Does this aircraft have an engine?
3. How does this aircraft become airborne?
4. What moves this aircraft through the air?
5. Does this aircraft help move people or things from place to place?
6. Is this aircraft useful or is it for fun?

ACTIVITY 2 (Continued)

Tell students that there are many kinds of aircraft. Explain that the different kinds of aircraft are grouped according to the way they sustain themselves (stay in the air) during flight. Distribute Student Handouts 1 and 2. Explain to the students that there are four groups of aircraft:

- 1 lighter than air
- 2 rotocraft
- 3 gliders
- 4 airplanes

Ask students to examine Student Handouts 1 and 2. Instruct students to determine the way in which each aircraft group sustains itself (stays in the air) during flight. Emphasize the four groups of aircraft by drawing the following diagram on the board.



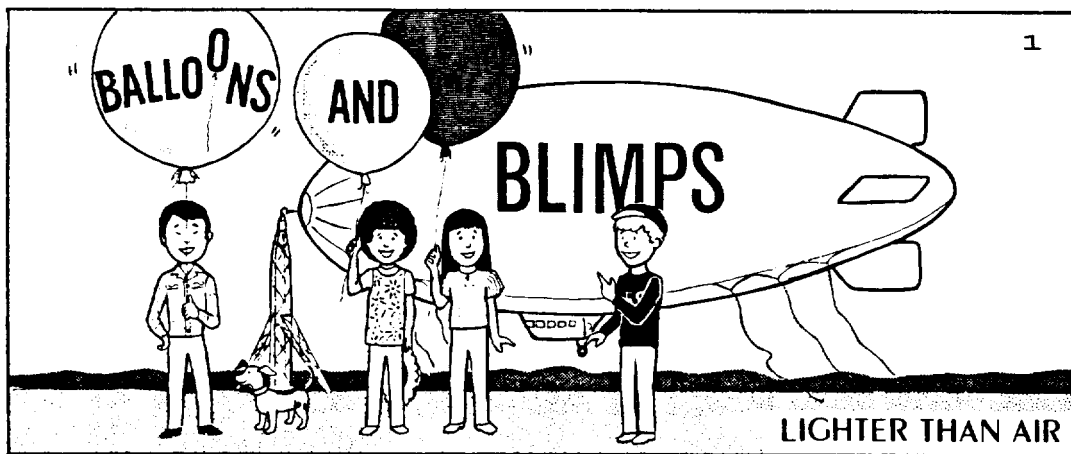
ACTIVITY 3: LIGHTER THAN AIR

Direct students' attention to LIGHTER-THAN-AIR aircraft. Develop an interest by asking questions such as the following:

1. What does lighter than air mean?
2. What kind of aircraft are lighter than air?

Explain to the students that balloons, blimps, and dirigibles are in the lighter-than-air aircraft group because they are lifted into the air by a gas that weighs less than air.

Distribute BALLOONS AND BLIMPS (Student Handouts 3, 4, and 5).



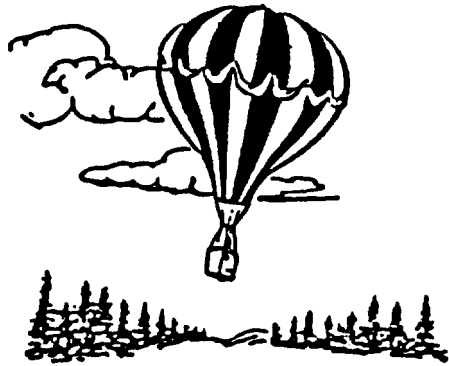
Cut sheets apart, stack, and staple to form a book. Read and discuss. Ask questions similar to the following:

1. What makes a balloon rise?
2. What is a blimp?
3. Compare a balloon to a blimp.
4. What are balloons and blimps used for?

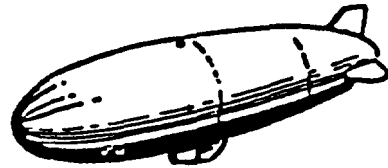
Explain that BALLOONS were the first aircraft that enabled man to break the bond that held him to earth. Today, the balloon is used primarily for sport. A hot-air balloon is made of a large, air-tight cloth or plastic bag filled with heated air. Hot air is lighter than cool air. The balloon rises because the heated air inside is lighter than the cool air outside. When the heated air cools, the balloon will stop rising and come down.

ACTIVITY 3 (Continued)

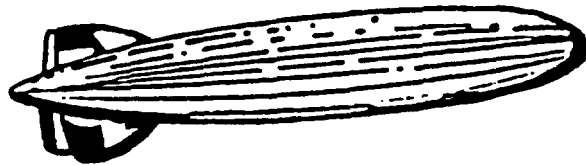
BLIMPS AND DIRIGIBLES are wingless, have an engine or engines, and can be steered with a rudder. Dirigibles do not exist today, and only a few blimps exist. Large corporations, such as the Goodyear Rubber Company, own and maintain blimps for advertising purposes. A blimp is really a small dirigible. A rigid piece of metal or wood runs along the bottom of the helium-filled envelope, to which a control car or cabin is attached.



Balloon



Blimp

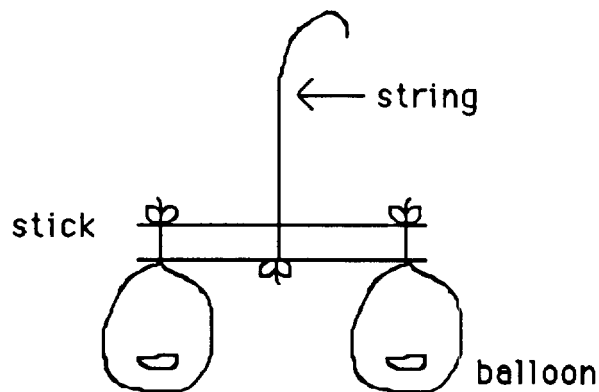


Dirigible

ACTIVITY 3 (Continued)

Extended Activities

- Explain to students that air has weight. Inflate two balloons to the same size. Tie ends with string. Attach a balloon to each end of a dowel. Tie a string to the middle of the dowel. Balance the dowel. Ask students to predict what will happen when one balloon is pricked with a pin. Explain why.



- Tell students that they are going to take an imaginary trip in a hot air balloon. Play the Little Thinker cassette tape: "Ways To Travel: A Balloon Trip." (Check Teacher Resource Section for purchase information.) Give students white drawing paper and crayons. Ask students to draw the things seen on the trip.

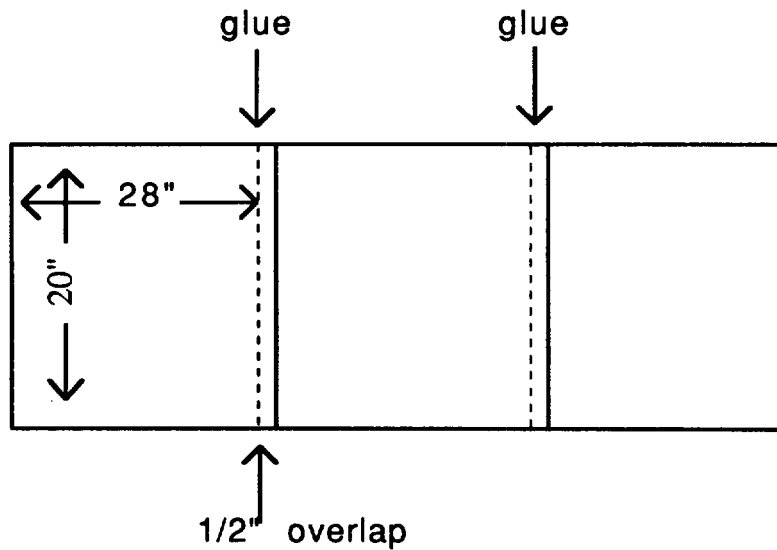
ACTIVITY 3 (Continued)

- HOT-AIR BALLOON CONSTRUCTION

Grades K-2
(Demonstrated
by the teacher)

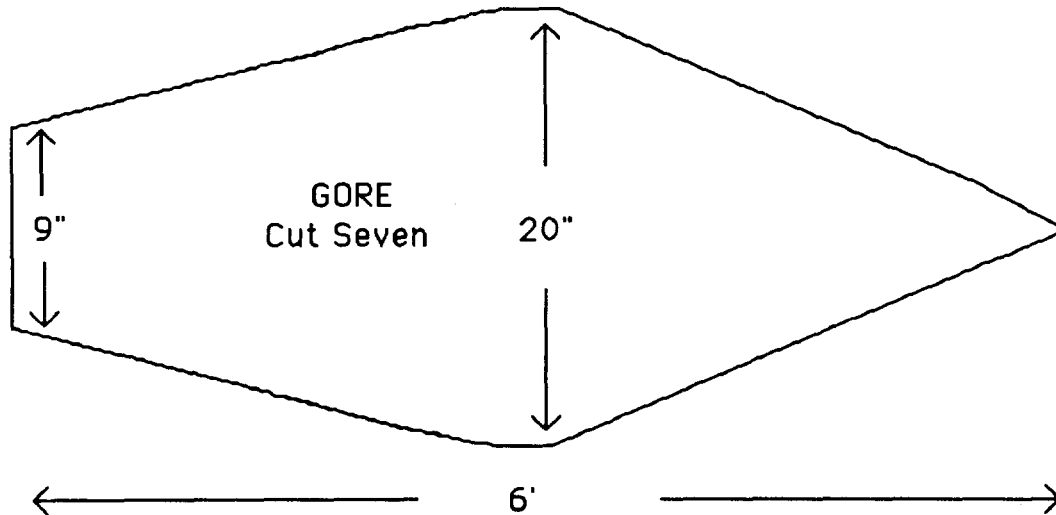
Grade 3
(Made by students in
groups of four or six under
adult supervision.)

- Carefully glue three sheets of 20" X 28" tissue paper together lengthwise. Overlap each sheet 1/2". Use glue stick or rubber cement.

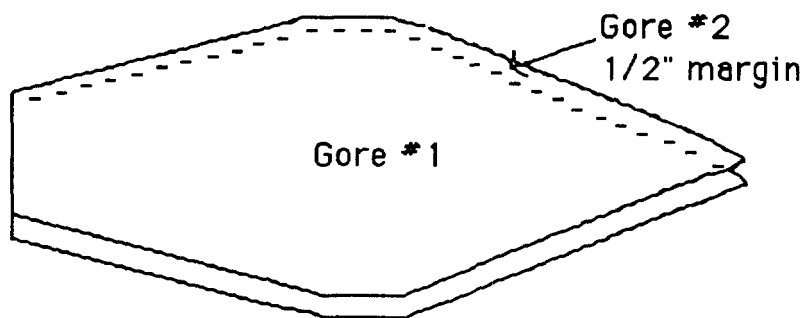


ACTIVITY 3 (Continued)

2. Repeat step one seven times. Stack the seven 84" long sheets of tissue. Draw the shape of a gore on the top sheet using the diagram below.

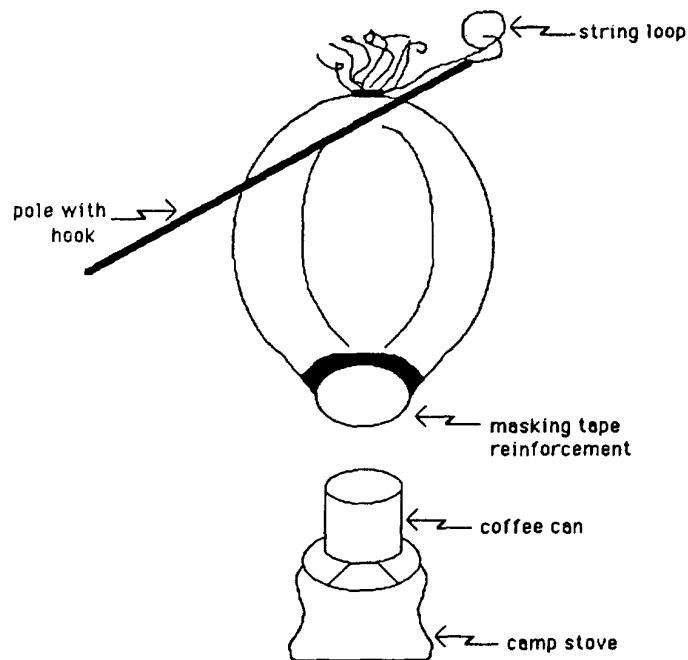


3. Cut out all seven gores at once using the top sheet as a guide.
4. Decorate the gores with felt tip pens.
5. Stack gores. Slide top gore #1 about one-half inch to the side of gore #2. Fold the one-half inch margin of gore #2 over gore #1. Glue the margin of gore #2 to gore #1.



ACTIVITY 3 (Continued)

6. Slide gore #1 and #2 to the side of gore #3. Leave a one-half inch margin. Fold the one-half inch margin of gore #3 over gore #2. Glue. Repeat this procedure with gore #4, #5, #6 and #7. Finally, glue gore #7 to the free edge of #1.
7. Gather the top of all seven gores (small opening) and tie with string. Make a loop in the string.
8. Bind the tissue paper at the bottom (large opening) of the balloon with masking tape. The masking tape reinforces the bottom edge of the balloon.
9. Use a single burner camp stove and a coffee can to direct the heat into the bag. Carefully ignite the stove. Place the coffee can on the grill of the stove. Use a pole with an attached hook in the end to lift the balloon (by the string loop) over the coffee can. Hold the masking tape reinforced opening by hand. Guide the opening over the heat source. When the balloon is inflated and becomes buoyant, let go. This operation takes 2-3 people.



ACTIVITY 3 (Continued)

Once the experiment is finished, evaluate the outcome with students. To clarify the term lighter than air, ask questions such as the following:

1. What made the balloon rise into the air?
 2. What made the balloon return to the ground?
 3. Predict how the balloon would perform on (1) a very cold day and (2) a very hot day.
- Have students write an adventure story about an imaginary trip in a hot-air balloon. Ask students to illustrate their stories.
 - Organize a debate about the following:
 - hot-air balloons vs. blimps
 - hot-air balloons vs. airplanes
 - Have students research the hot-air balloon:
 1. Discover the name of the inventor.
 2. Draw a diagram showing the parts of the balloon.
 3. Explain the function of each part.
 - Make PAPIER-MACHE BALLOONS: Give each student a round balloon, glue, water, and newspaper.
 1. Inflate the balloon '
 2. Mix equal parts of glue and water.
 3. Tear the newspaper into strips, dip in the glue mixture, and cover the inflated balloon.

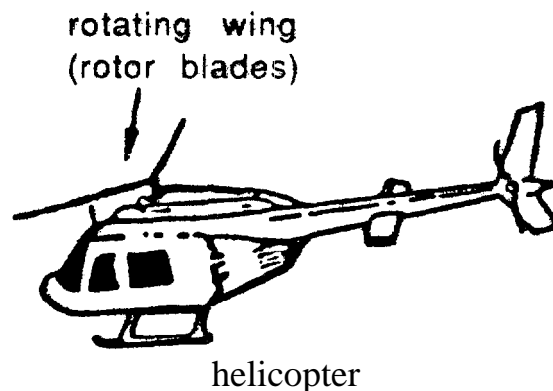
When balloons are completely dry, prick with a pin. Paint the balloons. Attach strings around the balloon and secure a small basket to simulate a gondola. Hang balloons from ceiling using transparent nylon string.

- Use elongated balloons to create dirigibles or blimps.

ACTIVITY 4: ROTOCRAFT

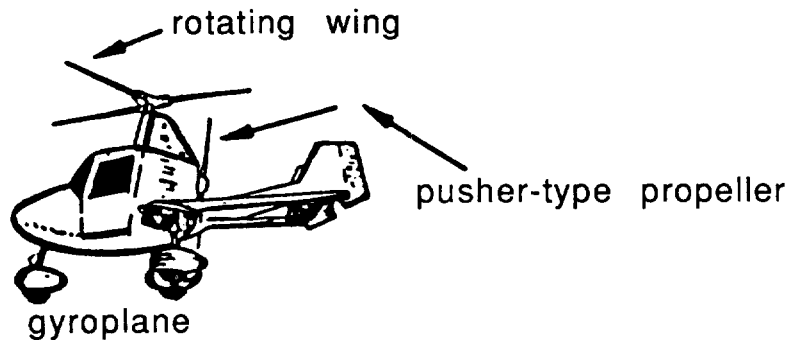
Explain to the students that the ROTOCRAFT is another group of aircraft. Tell the students that there are two kinds of rotocraft: the helicopter and the gyroplane. Rotocraft aircraft are different in that they become airborne by way of a rotating wing.

The HELICOPTER is wingless. It has a rotating wing called a "rotor." Air passing over the whirling rotor blades lifts the helicopter upward like the wing lifts the airplane. The helicopter is more versatile than any other aircraft. When taking off or landing, it can fly straight up or straight down. This allows it to go places other aircraft cannot. Helicopters require very little take off or landing space and can hover (stay in one place) while in the air. They can fly much closer to the ground than airplanes. The versatility of helicopters make them a valuable work horse. Accident victims can be picked up at the accident site and flown quickly to the hospital. News reporters use helicopters to check and report traffic conditions on busy city streets. Helicopters help farmers plant seeds, fertilize crops, and control insects. The helicopter can perform rescue missions in places that can not be reached by other forms of transportation.



ACTIVITY 4 (Continued)

The wingless GYROPLANE has a rotating wing to lift it and a pusher-type propeller in the rear to push it through the air. Few gyroplanes exist. They are used mostly for sport.



Distribute Student Handout 6. Read the story and discuss. Ask questions such as the following:

1. What lifts a helicopter into the air?
2. Compare a helicopter to an airplane.
3. Why are helicopters more versatile than airplanes?
4. Name jobs that need the use of a helicopter.

Distribute white drawing paper. Ask students to create a drawing of a helicopter using the five steps. Complete the picture showing the helicopter doing one of the jobs in the story. Ask students to share their pictures with the class.

Extended Activity

- Distribute Student Handout 7. Complete per directions.

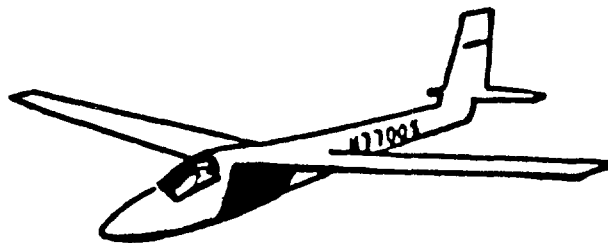
ACTIVITY 5: GLIDER

Stimulate the students' imagination by directing their attention to a group of aircraft without engines. Develop an interest by asking questions such as the following:

1. Do all aircraft have engines?
2. What do we call an aircraft without an engine?
3. What keeps it in the air?
4. What do you think it looks like?
5. Do you think this aircraft is useful?

After students have had an opportunity to brainstorm ideas, explain that the group of aircraft without engines is called GLIDER. There are two kinds of aircraft in the glider group: (1) sailplanes and (2) hang gliders.

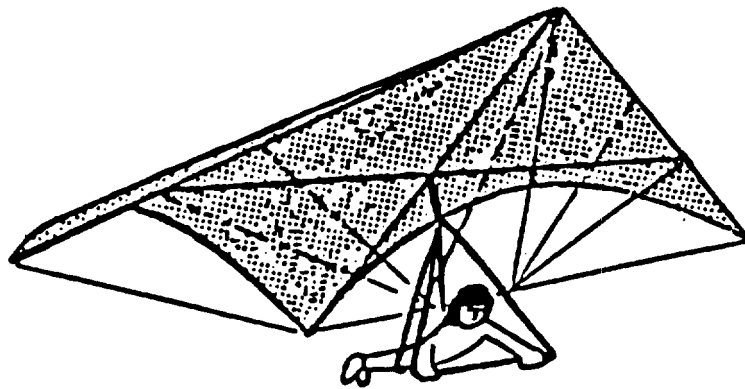
The sailplane is the most popular glider today. It is usually towed or pulled up into the air by an engine-powered airplane. A tow rope connects the sailplane to the airplane. The sailplane flies currents of rising air after the tow rope is released. Air currents called "up drafts" keep the motorless sailplane aloft. Warm air rising from hot, flat areas of the earth and wind currents that have been turned upward after hitting a hillside are necessary for a sailplane pilot to enjoy his sport.



Sailplane

ACTIVITY 5 (Continued)

The hang glider looks something like a triangle-shaped kite. A harness is attached to the underside to hold the pilot. The pilot, wearing the harness, holds the glider and runs down a hill or jumps off a cliff to become airborne. The wind lifts the glider into the air. The hang glider usually travels as fast as a car on a busy street. Hang gliders usually fly about as high as a one-story building. Experienced pilots may go higher but never as high as an airplane.



hang glider

Demonstrate the folding of paper to make a glider (paper airplane). Distribute white 8 1/2" X 11" paper. Ask students to design a paper glider of their choice. Decorate glider with crayons or felt tip pens. Take paper gliders to outside play area for test flight. Allow students to practice flying their gliders. After practice, have students line up and fly their paper gliders to determine the one that can fly the greatest distance. Formulate reasons why the glider that flew the greatest distance won.

Extended Activity

- Distribute wood glider kits. Remind students that directions are essential. Explain that directions must be followed step-by-step if construction is to be successful. Take completed glider to outside play area for test flight. Ask students to compare the flight of the wood glider with the flight of the paper glider.

ACTIVITY 6: AIRPLANE

Tell students that the most important group of aircraft is the AIRPLANE group. Arouse students' interest by asking questions such as the following:

1. Which group of aircraft do we see the most of: lighter than air, rotocraft, gliders, or airplanes?
2. Which group of aircraft transports the most people or cargo?
3. What group of aircraft is most useful to man? Why?

Explain to students that airplanes are heavier than birds, yet they can rise into the air and fly like birds. Further explain that airplanes have wings to lift them into the air and an engine or engines to pull them through the air. Small airplanes carry one or two people while larger ones carry 350 or more passengers. Some airplanes travel as slow as the family car. Others, like the Concorde-SST, travel as fast as 1,350 miles per hour. There are many different kinds of airplanes. Some airplanes have one engine, and some have two or more engines. Some airplanes land on land and others on water. The wings on some planes are attached near the top of the fuselage, and others have wings attached near the bottom (belly) of the fuselage.

ACTIVITY 6 (Continued)

Distribute Student Handout 8. Complete per directions.

Extended Activities

- Distribute Student Handout 9. Remind students that some airplanes land on land and some on water.

Student Handout 9 Answers:

1. d
2. a
3. c
4. b

- Distribute Student Handout 10. Make Aircraft Match Game per directions. Divide class into groups of three. Spread completed cards, face down, on a table. The first player selects two cards. If the cards match, he gets to keep them. The student continues to take another turn until the two selected cards do not match. When the cards do not match, they should be placed face down on the table. The next player selects two cards and repeats the process. Playing is continued until all pairs are matched.
- Draw the following graph on the board. Show students how to graph the characteristics of a boat and a car.

VEHICLE CHARACTERISTICS

| | Boat | Car |
|--------------|------|-----|
| wheels | | X |
| Engine | X | X |
| Moves People | X | X |
| Needs Roads | | X |
| Needs Water | X | |

ACTIVITY 6 (Continued)

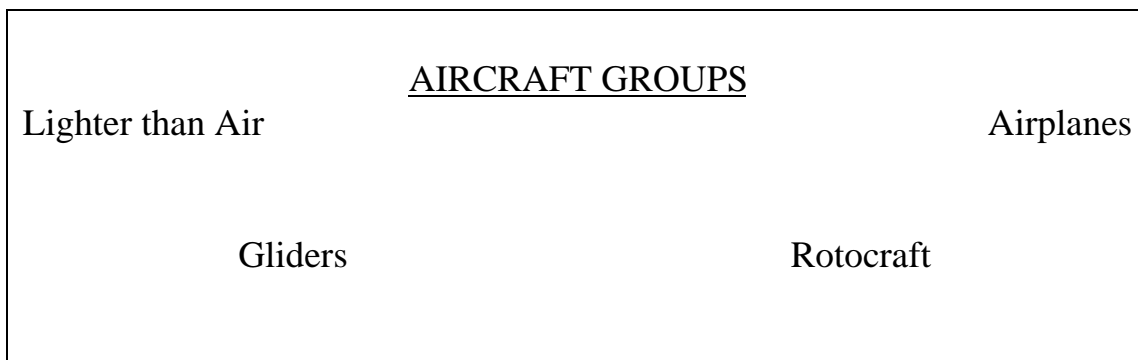
Discuss and compare the different characteristics of the boat and the car. Distribute Student Handout 11. Have students color a box on the graph for each characteristic of the balloon, blimp, glider, helicopter, and airplane. Discuss and compare aircraft on the completed graph. Ask students to evaluate the graph and select the most useful kind of aircraft.

- Distribute Student Handout 12. Complete per directions. Compare the different kinds of aircraft.

Student Handout 12 Answers:

| | |
|---------------|-----------|
| 1. helicopter | 4. rocket |
| 2. airplane | 5. blimp |
| 3. balloon | 6. glider |

- Develop an "AIRCRAFT GROUPS" bulletin board. Use pictures that students cut from magazines. Ask students to identify each aircraft. Place the aircraft picture under the correct group: lighter than air, gliders, rotocraft, or airplanes.



- Have students select an aircraft group and research the library for information. Have them write a story about the group and illustrate the story. Display stories on the Aircraft Groups bulletin board.
- Write Topic 1 words in Fantastic Flight Dictionary.

TOPIC 2: THREE USERS OF AIRCRAFT

The activities, suggested materials, grade level, and related subject areas for each activity are summarized below.

| <u>ACTIVITY</u> | <u>MATERIALS NEEDED</u> | <u>GRADE LEVEL SUBJECT</u> |
|------------------------|---|--|
| 7. Aircraft Users | Student Handout 13 aviation magazines | Grades K-3 social studies language arts |
| 8. Military | white drawing paper Student Handouts 14 and 15 | Grades 1-3 art social studies mathematics |
| 9. Airlines | Student Handout 16 | Grades 1-3 language arts mathematics |
| 10. General | Student Handout 17 aviation magazines, coat hanger, index cards, glue, string Fantastic Flight Dictionary Student Handout 18 Student Handout 19 Books: <u>Farmer John</u> and <u>Ag Aviation and Friends</u> (See Teacher Resource Section [Women of National Agricultural Aviation Association] for address.) | Grades 1-3 social studies language arts |

ACTIVITY 7: AIRCRAFT USERS

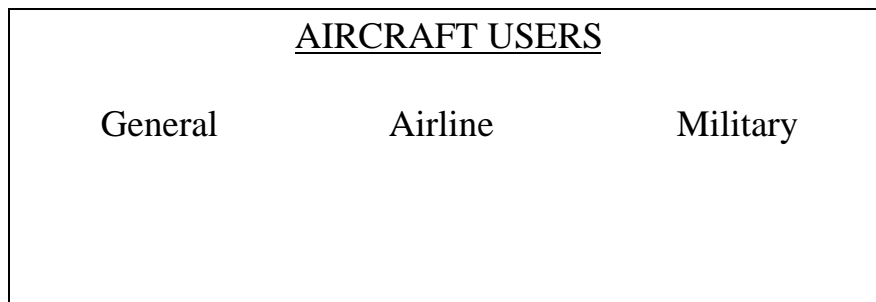
Explain to the students that there are three users of aircraft. each user uses aircraft to do many different jobs.

1. **MILITARY USE** refers to the Army, Navy, and Air Force aircraft that stand prepared to defend our nation.
2. **AIRLINE USE** refers to aircraft that move passengers and cargo for pay-
3. **GENERAL USE** refers to all flying that is not airline or military.

Distribute Student Handout 13. Ask students to examine the three different users of aircraft as pictured on the handout. Point out that all aircraft have a special purpose or use by asking questions about the handout such as:

1. Who owns and operates this aircraft?
2. What does this aircraft do?
3. How does this aircraft help us?
4. Does this aircraft help many people or only a few?

Cover a bulletin board. Make title cards per diagram.



Distribute aviation magazines. These may be obtained from the local airport or pilots. Have students cut out pictures of different kinds of aircraft. Discuss the uses of each. Attach pictures under the correct user.

ACTIVITY 8: MILITARY

Direct students' attention to military aircraft. Arouse an interest in different kinds of military aircraft by asking questions such as:

1. Who is the military?
2. What do you think the military uses aircraft for?
3. What does the military do with the following kinds of aircraft?

| | |
|-----------------|----------------------|
| bombers | reconnaissance |
| attack aircraft | observation aircraft |
| fighters | transports |
| tankers | trainers |
4. Do you think military aircraft are expensive (1) to purchase, (2) to maintain, and (3) to fuel?
5. Who pays for military aircraft?
6. Why does the military own these aircraft instead of you, your father, or a friend?

Explain that bombers and attack aircraft destroy things on the ground; fighters destroy other aircraft; reconnaissance and observation aircraft watch what the enemy is doing; transports airlift men and materials; tankers are gas trucks in the sky; and trainers are used to teach men to fly.

ACTIVITY 8 (Continued)

Explain that it is very expensive to operate all these planes. Our tax dollars keep them flying. Military aircraft keep our country safe.

Distribute white drawing paper. Tell students to pretend they have been asked by the military to design a new military aircraft. Ask students to draw their idea and be prepared to tell the class about their aircraft design and what it will do.

Extended Activities

- Invite a speaker from a branch of the military (Air Force, Navy Army, or Coast Guard) to explain the importance of aviation to our national security. Have the speaker further expand by discussing the expense incurred in designing, purchasing, and maintaining military aircraft.
- Distribute Student Handouts 14 and 15. Read the story on Student Handout 14. Work the mathematics problems on Student Handout 15.

Student Handout 15 Answers:

- | | |
|-------|-------|
| 1. 22 | 3. 10 |
| 2. 4 | 4. 21 |

- Tell students to pretend they have been asked by the military to design a new military aircraft. Ask students to build their design from junk (milk cartons, tissue tubes, or wood scraps) found at home. Ask students to write or be prepared to tell the class about their aircraft design and what it will do.

ACTIVITY 9: AIRLINES

Explain to the students that airline aircraft users are paid to move people and cargo. Help students develop an understanding of the differences between airline and military aircraft by asking questions such as:

1. Who owns military aircraft?
2. Who owns airline aircraft?
3. Who flies military aircraft?
4. Who flies airline aircraft?
5. What do military aircraft do?
6. What do airline aircraft do?
7. Can we fly on military aircraft?
8. Can military men/women fly on airline aircraft?

Invite a guest speaker from an airline (airline pilot, stewardess, air-cargo agent, or ticket agent) to speak about topics such as:

1. the different services, other than passenger service, offered by the airlines
2. airline careers
3. the importance of the airlines
4. the effect the airlines have on the economy

Extended Activity

- Distribute Student Handout 16. Complete per directions.

ACTIVITY 10: GENERAL

Direct students' attention to the general user of aircraft. Stimulate an interest by asking questions such as:

1. What are some other uses of aircraft that are not military or airline?
2. Have you ever flown in an aircraft that was not military or airline?
3. How does the use of an aircraft help the injured and sick?
4. What is meant by "farming from the sky"?
5. How does the forest ranger use aircraft?
6. Do you think people fly just for the fun of it?

After students have had ample time to discuss the questions above, explain that GENERAL users of aircraft touch peoples lives in many different ways. General users of aircraft include all flying that is not military or airline. To the businessman, it means an efficient, productive means of transportation. Farmers plant large fields quickly by farming from the air with aircraft. The forest ranger looks for sick trees, fires, and fights fires using aircraft. Aircraft can also perform aerial mapping, carry patients, watch herds of cattle, conduct search and rescue, and check power lines and pipelines.

Distribute Student Handout 17.

Student Handout 17 Answers:

- | | |
|----------------|-----------------|
| 1. hospital | 4. sport pilot |
| 2. farmer | 5. sport pilot |
| 3. sport pilot | 6. business men |

ACTIVITY 10 (Continued)

Extended Activities

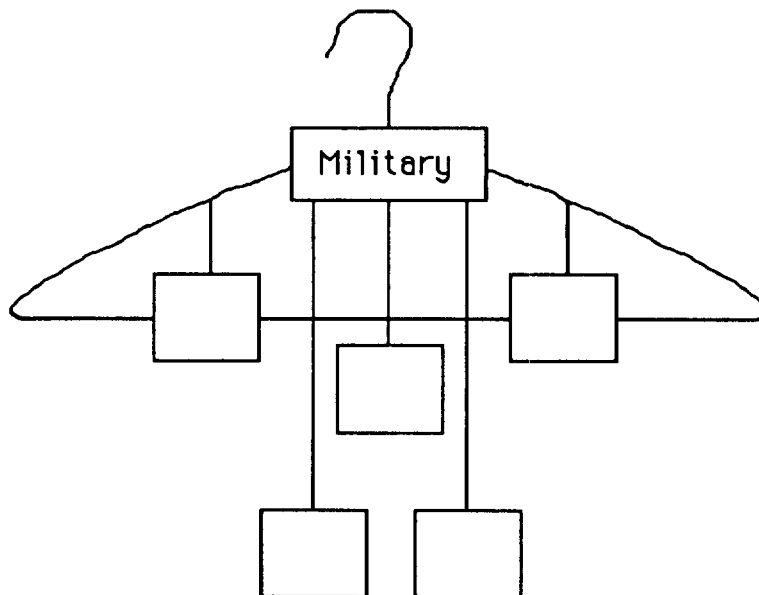
- Review the three users of aircraft. Divide class into three groups. Assign each group an aircraft user (military, airline, or general). Give each group a coat hanger, aviation magazines, index cards, glue and string. Tell each group to make an aircraft user mobile.

1. Label two (2) index cards with aircraft user name.



2. Glue the cards back to back, to the neck of the hanger.
3. Cut out pictures that depict the aircraft user. Glue the pictures to index cards.
4. Attach the index cards to the hanger with string.

Suspend students' work from ceiling with string.



ACTIVITY 10 (Continued)

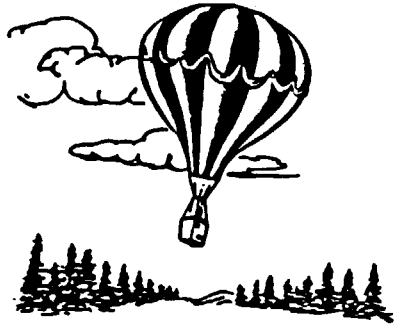
- Write Topic 2 vocabulary words in the Fantastic Flight Dictionary.
- Write a sentence with each vocabulary word.
- Write a story using the vocabulary words. Display stories on Aircraft Users bulletin board.
- Ask a pilot or forest ranger from the Alabama Forestry Commission to speak. (Check with your local airport for contacts.) , Ask speaker to discuss the use of aircraft for fire control, forest inventories, and disease control. Suggest that the speaker use a slide or film presentation to enrich the program.
- Distribute Student Handout 18. Discuss reasons why aircraft are more useful to the forest ranger than the forest tower. Color the picture.
- Ask a crop duster to come speak. (Contact a local airport for crop dusters in your area.) Distribute Student Handout 19. Read the story. Draw a crop duster planting seeds.
- Show the film "Farming from the Sky." This film is free, on loan, from the Federal Aviation Administration. (Check Teacher Resource page for address.)
- Distribute one of the following coloring books:Farmer John's or Ag Aviation and Friends. Read the story of how aircraft helps put food on our table. Color pictures. (Check Teacher Resource page for ordering information.)
- Invite guest speakers to expand students' knowledge of general use of aircraft such as:
Alabama State Police - Aircraft for traffic control
Air Ambulance Service - Aircraft for medical services
Local business aircraft owners - (Check your local airport operator for contacts.)

UNIT 2 ACTIVITY 2

STUDENT HANDOUT 1

KINDS OF AIRCRAFT

1. Lighter-Than-Air



Hot-Air Balloon

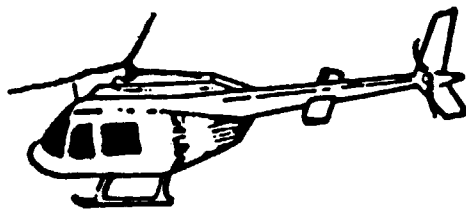


Dirigible

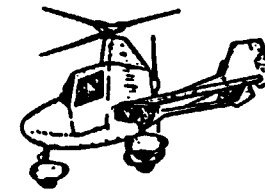


Blimp

2. Rotocraft



Helicopter



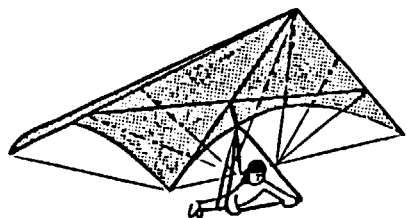
Gyroplane

UNIT 2 ACTIVITY 2

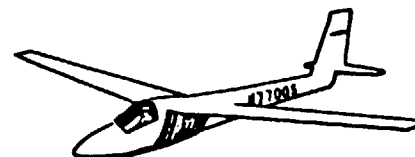
STUDENT HANDOUT 2

KINDS OF AIRCRAFT

3. Glider

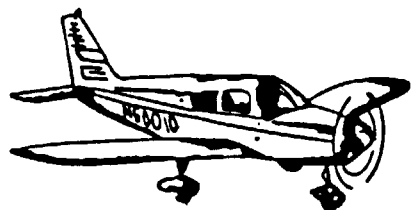


Hang Glider

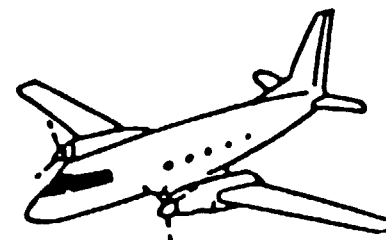


Sailplane

4. Airplane



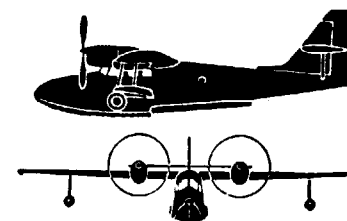
Single-engine land



Multi-engine land



Single-engine sea



Multi-engine sea